

- **AI training** on a server hosted in Germany without own expensive hardware.
- The training is carried out with **high-performance GPUs (NVIDIA T4)** and is scalable as required, i.e. several trainings can be carried out simultaneously.
- Simple, fair billing system.
- Data security is **TISAX certified**.
- Upload **any amount of labelled image data**. The training data is stored on the server.
- The user has **various pre-trained algorithms** for object recognition at his disposal, with which an optimally functioning model can be trained for any application.
- Other **useful AI tools**, e.g. an **online labelling tool** and a **testing area** for **online evaluation** of the trained AI models.



AIBox by VisionTools

Multicore GPU Workstation with REST-API interface for AI evaluation

The **edge device** is fanless, energy-efficient and designed for a wide temperature range. Power is supplied either via **PoE+** or external 24V DC.

A powerful **NVIDIA Jetson AGX multi-core GPU** with 32GB (512 CUDA and 64 Tensor Cores) is used as processor.

A **TensorFlow framework** is the internal software basis for machine learning.

An **integrated web server** is available for configuring/uploading the trained model.

With the independent module, even older systems can be retrofitted with artificial intelligence. Everything necessary for use with V60 is already pre-installed.

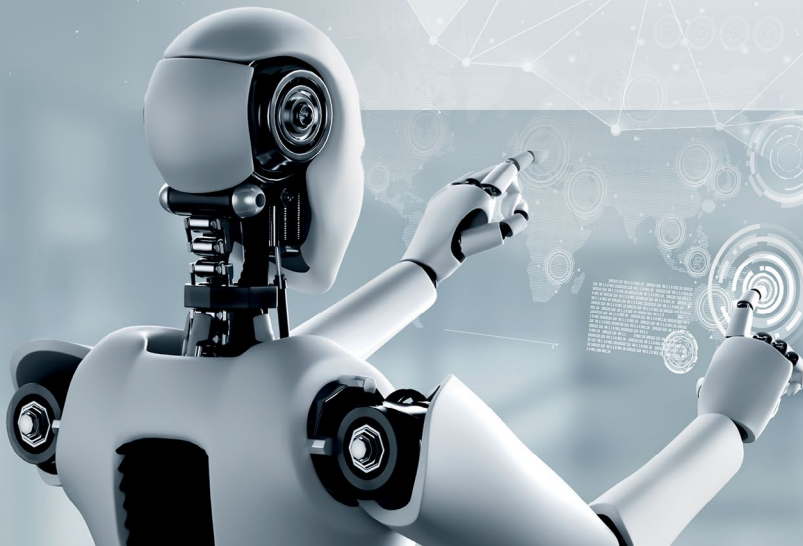
By using the **REST-API interface**, the device can also be used for other software solutions.

Do you have questions about solutions in the field of artificial intelligence? We will implement a system based on AI for you or help you to successfully use deep learning technologies yourself in your application.



DEEP LEARNING VISION SYSTEMS

Machine vision with artificial intelligence
AI tools by VisionTools





Deep Learning Vision Systems

AI – Artificial Intelligence

Classical machine vision was and is superior to human capabilities in terms of speed, repeatability and accuracy and achieves best results in quantitative measurement of structured scenes.

In contrast, humans are suited to learning by observing examples or specifications of test parts. In this way, he can distinguish between slight errors in appearance, such as those caused by perspective distortions or differences in brightness, and actual functional errors. It can assess for

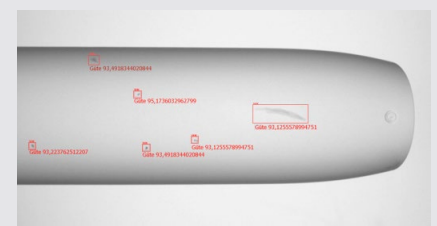
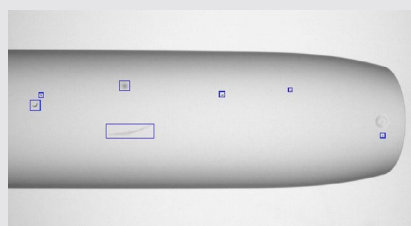
itself whether a change in appearance affects the required quality.

AI technology uses neural networks to achieve a learned knowledge that enables it to distinguish between anomalies, shapes and characters, while tolerating natural deviations. Thus, artificial intelligence combines the superior flexibility of humans with the performance of a machine system.

Examples of applications with the use of AI

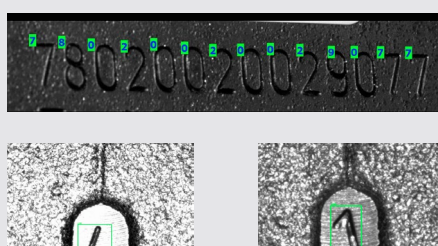
- The **surface inspection of a curved housing** is one of the most problematic tasks in conventional machine vision. In the image data, a wide variety of NOK examples are classified using so-called labels, then taught in by AI training and reliably found in the evaluation.

Bereiche	Merkmal Auswählen	In Zeile	Merkmal in Tabelle Eintragen					
6	NOK	5	X	Y	Breite	Höhe	Merkmal (Klasse)	
			1	264	896	23	24	NOK
			2	791	937	21	23	NOK
			3	1894	1007	52	24	NOK
			4	1490	873	14	14	NOK
			5	1130	890	20	20	NOK
			6	273	930	10	11	NOK

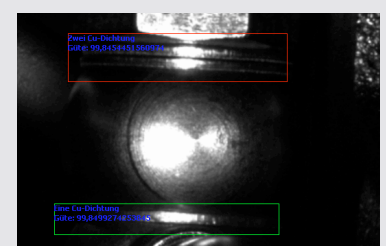
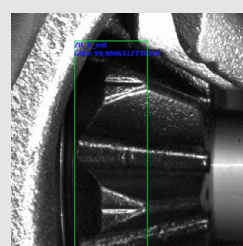


Labelling in V60 can be done manually or fully automatically. Surface errors are reliably evaluated by the AI.

- **Character recognition**, even of embossed characters cropped in the image - **99% recognition**.



- **Type recognition** based on a taught-in feature. **Completeness check** of sealing rings - **99% recognition**.



AI Tools by VisionTools

For the use of AI in machine vision projects, VisionTools offers complete tools for the installation of a deep learning inspection system.

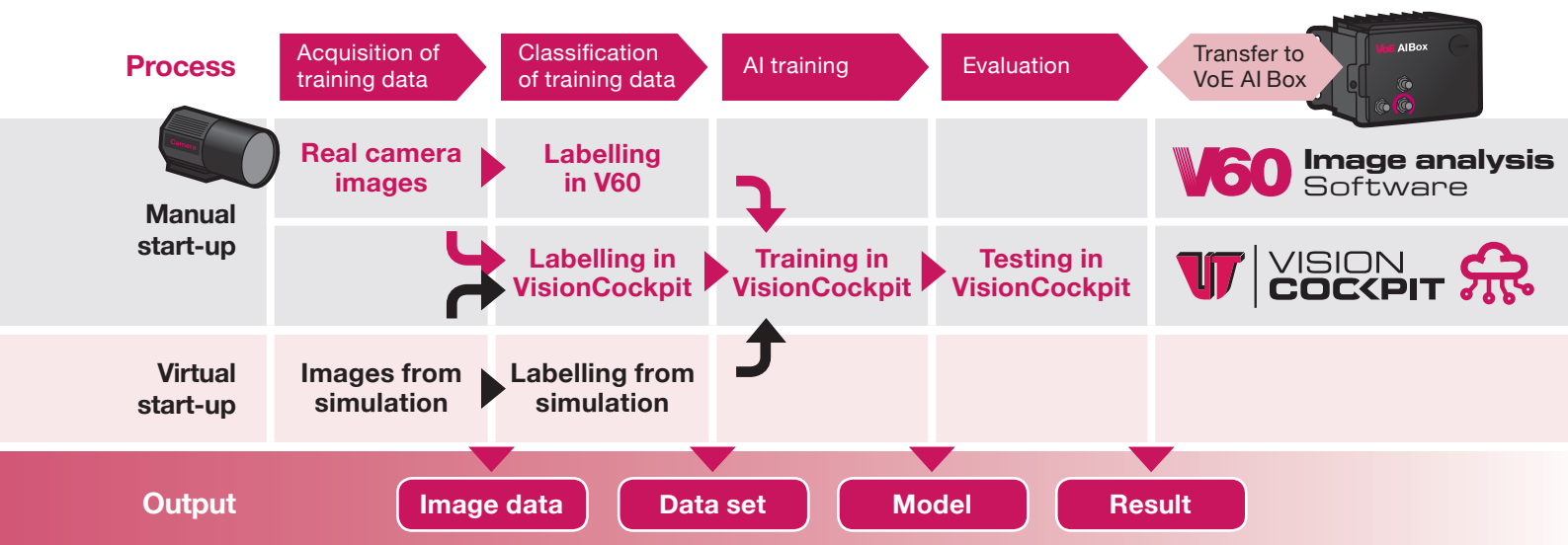
How do I get a fully trained AI model?

Generating image data: Real camera images with **industrial cameras from VisionTools**. Alternatively, **synthetic images** can also be **generated from simulations with CAD data**.

Labelling - classification of the image data: Inspection-relevant image areas, as well as type classes, can be labelled **online via the VisionCockpit platform** from VisionTools; alternatively, **offline with VisionTools V60** or directly when generating the synthetic images. In combination with the image data, the labelling data forms the **data set** with which the AI model can be trained.

Training an AI model: Online training in **VisionCockpit** using pre-trained neural networks.

Evaluation of an AI model: The functionality of a trained model can be checked in advance directly in the **testing area of VisionCockpit**.



How do I analyse images with AI?

The **trained AI model** is loaded **onto the VoE AI Box** with integrated web server.

The AI box communicates with the peripherals via a REST interface. Requests, including the image, are transmitted via http protocol and the AI evaluation results are available a few tenths of a second later. Several models can be stored on the AI Box.

The evaluation software **VisionTools V60** already contains ready-made, configurable objects for communication with the AI Box and is ideally suited for image acquisition, controlling the AI Box, handling communication with the PLC, visualisation and image storage according to various criteria.