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Industrial image processing on SIMATIC IPCs

SIMATIC IPCs

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1 Introduction

1.1 Overview

Industrial image processing has become more and more important in recent years. Due to increasing demands on product quality and quality tracking, this has become a key technology in manufacturing.

Image processing works with optical measuring methods. These have the advantage that they work contact-free, area-wide, non-destructively and more reliably than humans.

The application sectors today include mechanical engineering, shipbuilding, aircraft construction, the automotive industry, microelectronics, pharmaceuticals, logistics as well as traffic and safety technology.

Different 1D/2D/3D image processing systems are used within the various industries. As a result, PC-based image processing systems are trimmed for high performance. The complexity of the inspection task, inspection interfaces, process speed and expandability make PC-based image processing tasks a high-end solution.

This document is intended to assist you in selecting a suitable IPC for your image processing task. You get an overview of how to solve industrial image processing using a SIMATIC IPC.

1.2 Fields of activity in industrial manufacturing

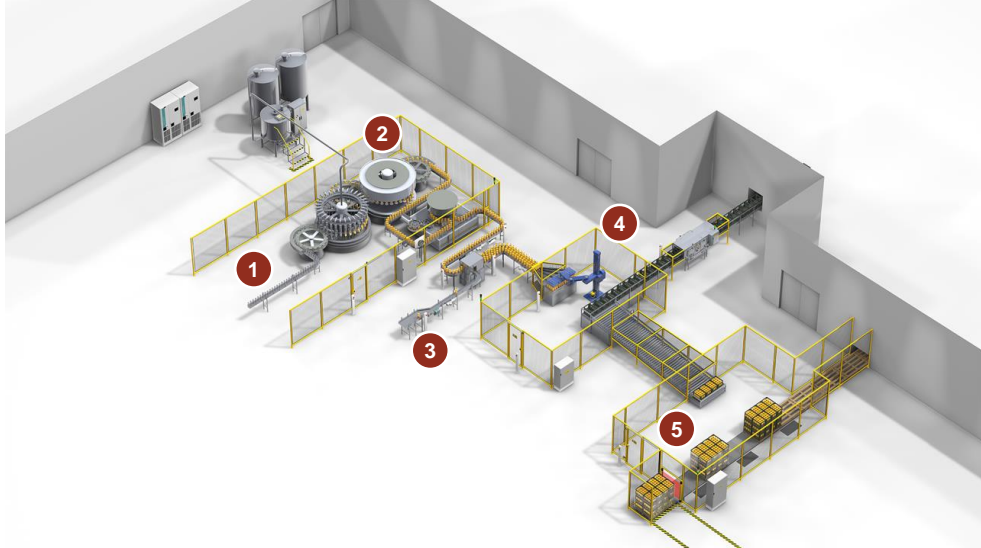
The fields of industrial image processing are manifold. In the following some fields of application are listed.

- Object detection
- Font / character recognition
- Position detection
- Completeness test
- Shape and dimension test
- Surface test
- Material identification
- Quality check
- Position detection
- Pattern detection
- Video monitoring
- Robot guidance
- Person recognition
- Automated guided vehicle systems (AGV)
- ...

Fields of application of industrial image processing on the basis of a bottling line

The following shows the production of a bottling line. Five production processes are used to demonstrate how industrial image processing is used for the production process.

Figure 1-1



1. Material test

Incoming bottles are checked for cracks and unevenness. The damage-free bottles are then available for further processing. Damaged bottles are sorted out.

2. Completeness check

The filled bottles are then checked for completeness. If the filled quantity is not within the tolerance range, the bottle is sorted out in the subsequent process step.

3. Quality check

All bottles that do not comply with the standard (filling quantity, incorrectly printed label, no cork) are sorted out. The quality data is stored in the system for subsequent tracking.

4. Robot guidance / position identification

In order for the robot to be able to grip the suitable bottle, a position detection is carried out to determine the x, y and z coordinates. The bottles are then placed in the crate.

5. Font / character recognition

Before the pallet with boxes leaves the production, the font and the barcode are checked. These include shipment tracking. The shipment is checked out in the system with a time stamp.

1.3 Components used

The following hardware and software components were used to create this application example:

Table 1-1

Components	Quantity
SIMATIC IPC	1

This application example consists of the following components:

Table 1-2

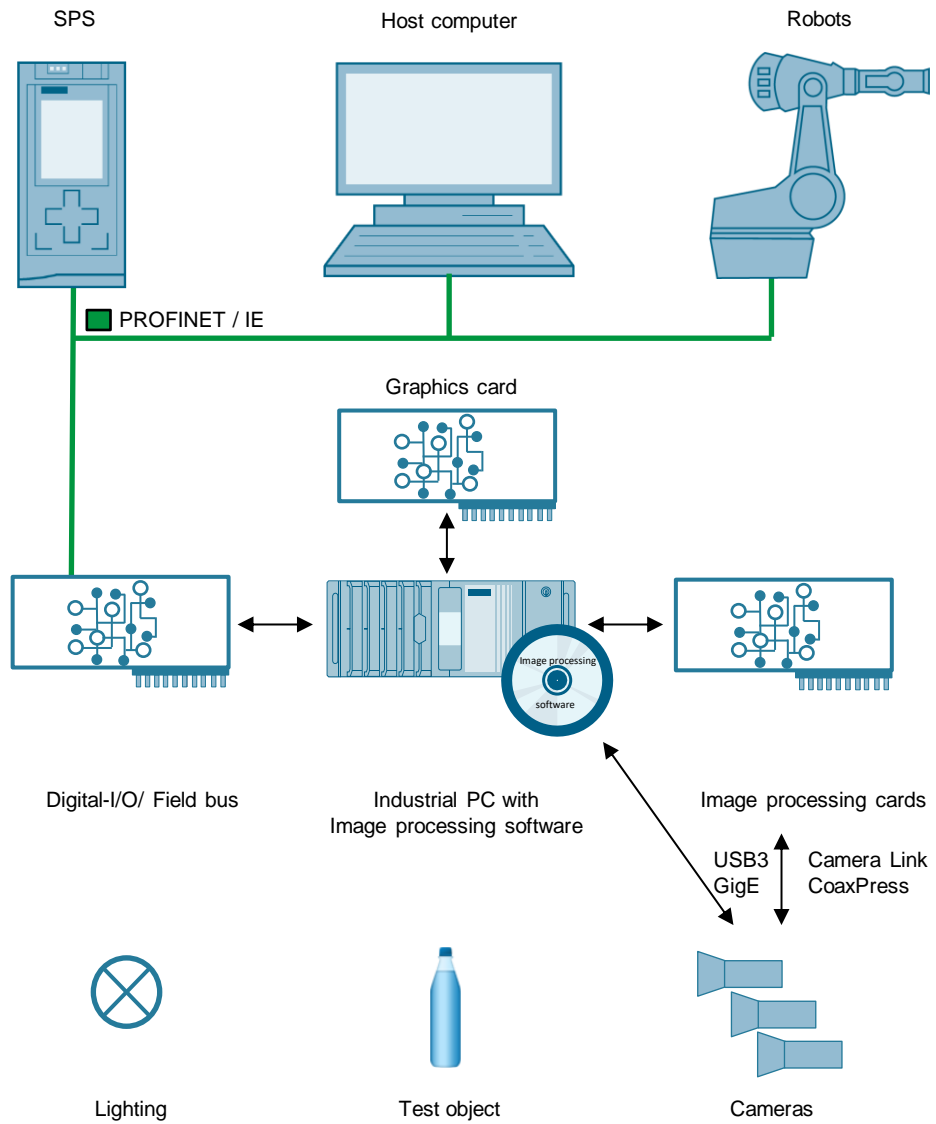
Components	Note
109766012_Industrial_image_processing_IPCs_Docu_v1.0_en.pdf	This document.

2 Basics

2.1 Hardware setup

The following application example consists of the IPC547G production computer. An industrial image processing software is used on this.

Figure 2-1



2.2 Image acquisition

Within the image acquisition the challenges caused by the measuring object, the illumination and the sensors / cameras are considered.

2.2.1 Test object

Each test object behaves differently due to its individual chemical, mechanical, geometric and optical properties.

These challenges may include:

- The nature of the product surface:
Glossy surfaces tend to reflect light if incorrect lighting technology is used.
- Position of the test object:
Tilted test objects lead to incorrect measurement results during length measurements.
- Contaminations:
Oils + greases in production environments lead to contamination of the component, which can influence the test result.
- ...

The preparation of a requirement and functional specification brings your test object to be examined for your image processing solution to success.

Note

Send your test object to be examined to the image processing company for a feasibility study. Send good and bad parts, as well as components that are just within the tolerance range.

This can give you a recommendation for the design of the required cameras, illuminations and lenses.

2.2.2 Lighting

The selected lighting technology makes it possible to highlight certain features or make other features disappear.

The aim is to create a stable and homogeneous light field over the entire area to be analyzed (ROI) in order to create optimum contrast. Only if a sufficient contrast is available, the essential features can be evaluated by the software afterwards.

The illumination is therefore a decisive factor for the quality of the image to be evaluated. If, for example, extraneous light occurs (sunlight), this leads to disturbances in the result.

It is also important to take into account the nature of the object, e.g. glossy surfaces, and to ensure that the correct type of background lighting is used to prevent light scattering.

Basic lighting types include reflected light, transmitted light, brightfield, darkfield, coaxial and dome lighting. Lighting is therefore one of the most important factors for the stability of the overall system.

2.2.3 Lens

To capture a camera image of an object, a lens is required. The light rays are imaged behind the lens on a light-sensitive surface of the camera sensor.

A lens consists of a lens system and one or more apertures. The aperture controls the amount of light falling on the sensor and the depth of field. If a higher depth of field is required, close the aperture on the lens. A higher aperture value also results in a longer sensor exposure time. A wide aperture ensures short exposure times, but also results in a shallow depth of field.

The focal length of the lens provides a given working distance, which determines the magnification. The lens thus influences the measuring accuracy, accuracy and speed of image processing.

For mounting a lens to a camera, there are various camera mounts such as S-Mount, C-Mount, CS-Mount, F-Mount.

Special lens types

Entocentric lenses: Entocentric lenses are the most commonly used lenses. These lenses are available as zoom lenses or with fixed focal length. Many of these lenses are small in size, which is why they can be used in production environments where space is limited. An area of application is, for example, the presence control of an object.

Telecentric lenses: This lens is designed so that the image size does not change when the distance between the captured object and the lens changes (the rays run parallel here). This type of lens is particularly suitable for non-contact and precise measurements. Telecentric lenses are usually very large, since the diameter of a lens must be as large as the test object.

Super wide angle lenses: With this lens 360° shots are possible. Such lenses are suitable for checking the presence of rotationally symmetrical parts, for example in bearings.

2.2.4 Sensors / Cameras

In addition to choosing the right lighting system and lens, it is important to determine the right image sensor.

Image sensors use components to convert light, i.e. photons, into electrical signals. These are then discretized in time, quantized and finally stored. The electrical charge on the image sensors depends on the intensity of the incident light and the exposure time.

The most commonly used image sensors are CMOS and CCD sensors. On one side a charge-coupled component (CCD sensor), on the other side a sensor with additional metal oxide semiconductor technology (CMOS sensor). Both sensors are area sensors. The image size is determined by the number of rows and columns. The image sensor thus has the function of converting the light that occurs into an optimal digital image.

2.3 Image processing

Image processing boards (frame grabbers), interfaces, IPC and image processing software are considered within the image evaluation.

2.3.1 Image processing cards (frame grabbers)

An image processing board, also called a "frame grabber", is an expansion board for the IPC. This is connected to the motherboard via the PCI or PCI Express bus.

The frame grabber transfers the high-resolution image data via the PCI bus to the memory of the IPC. At that time the frame grabber had the task to convert analog signals into digital signals. Nowadays, frame grabbers can take over other tasks in addition to image acquisition, such as pre-processing images. In addition to signal processing, the frame grabber is also responsible for triggering the camera.

By using image processing boards, the computing unit of the IPC is relieved. Frame grabbers are used for sophisticated solutions in the data transfer of an image processing system.

Image processing boards are often equipped with the communication interfaces "CameraLink" or "CoaxPress". These interfaces represent the fastest connection between cameras and IPCs and thus support very high resolutions.

When selecting image processing boards, make sure that they are compatible with the image processing software.

2.3.2 Interfaces

For image transmission between PC and camera, interfaces are required consisting of cable, plug, expansion cards (optional) and software. Standards such as GigE, USB3.0, Camera Link, Camera Link HS or CoaXPress have established themselves in industrial image processing. Each of these standards has different characteristics in terms of bandwidth, data transfer format, robustness, distance and plug & play functionality.

In the following, the individual interfaces will be discussed in more detail.

Interfaces without Frame Grabber

The cost-effective transmission method consists of using image data from the consumer world via standard interfaces. Generic interfaces such as USB3 or Gigabit Ethernet (GigE) are used for this purpose. Therefore no frame grabber is required for the transmission.

GigE Vision

In 2006 the "GigE Vision" standard was released. This allows cameras to communicate with the IPC using the Gigabit Ethernet standard (both 1GB and 10GB).

One advantage is that cameras can be connected to the IPC over long distances. Many cameras can be powered via Power over Ethernet (PoE). If UDP/IP is used instead of TCP/IP, point-to-multipoint connections are also possible. This enables cameras to transmit image data to several computers simultaneously. Complex processing operations can thus easily be divided among several computers.

The "GigE Vision" standard is one of the most widely used image processing standards due to its easy commissioning. Very long distances can be transmitted using cost-effective network cables. Network cards and switches that support jumbo packages should be used for smooth transmission.

USB3 Vision

In 2013 the "USB3 Vision" standard was published. Cameras can be connected directly to a USB port via the USB3 interface. With Plug & Play functionality, cameras can be supported with any USB3 Vision compatible image processing software. The range using passive cables is limited to five meters. For higher ranges, use active cables with built-in amplifiers.

Interfaces with Frame Grabber

Frame grabbers are required for high-end image processing applications. If, for example, printed circuit boards or smartphones are inspected for quality, high resolutions in the megapixel range are produced. Standards such as "CameraLink" or "CoaXPress" are used to transfer this image data effectively and efficiently. These require a special data cable for transmission. When selecting image processing boards, make sure that they are compatible with the image processing software.

Camera Link

Camera Link has a high bandwidth. When implementing CameraLink, make sure that Camera Link uses a point-to-point architecture. Therefore, each camera needs its own interface channel in the computer. With "Power over CameraLink", cameras can be directly supplied with power. This reduces the wiring effort.

Camera Link HS

With "Camera Link HS" you can transfer your data faster with copper or fiber optic cables. The bandwidth of Camera Link HS has been increased compared to CameraLink. Camera Link HS also uses a point-to-point architecture.

CoaxPress

Due to the ever increasing resolutions and ever higher frame rates which lead to a higher amount of data to be transferred, it was decided in 2010 to define the CoaxPress standard. CoaXPress is faster than the CameraLink and GigE standards. Due to the fast image data interface, high data streams can be realized for high-end applications. The cameras are connected to the frame grabber with coaxial cables.

2.3.3 SIMATIC IPC

Due to their proximity to the machine, image processing components are exposed to industrial interferences such as electromagnetic interference, shock and vibration in continuous operation around the clock. IPCs designed for the industrial environment should be used to ensure smooth production operation.

When configuring your IPC, pay attention to the environmental conditions in which you want to use the IPC. Depending on this are memory and hard disk configuration, number of processors, hardware redundancy, case size and fan configuration. Due to the extensibility of PC-based solutions, they are recommended as development platforms for changing customer requirements.

If the requirements change in the course of a project, you can easily convert from a single camera system to a multi-camera system due to the expandability. You can retrofit the IPC with various frame grabbers, GPUs, I/O plug-in cards, RAID data storage, power supplies.

By using graphics cards, you can increase the speed of image processing. Due to the parallel architecture of the GPU, many processes can be executed simultaneously. In neural networks, GPUs are often used for teaching and evaluating images.

2.3.4 Image processing software

The image processing software offered on the market is very diverse. When selecting software from third-party vendors, consider the following criteria:

- **User-friendliness:**
A simple configuration interface saves you and your employees training time.
- **Expertise:**
Pay attention to the expertise of your personnel. Development environments exist on the market that have implemented a wide variety of algorithms. This saves you development effort.
- **Flexible expansion through software development kits:**
Software Developments Kits enable you to integrate image processing solutions into your own software solutions. These contain a collection of software libraries and APIs that allow programmers to incorporate their own solutions into their applications. For example, you could develop your own controls to integrate them into your visualization.
- **Supported cameras:**
Pay attention to which camera interfaces and frame grabbers the software supports.
- **Service and maintenance offer:**
Ensure long-term availability of the supplier. Ensure that devices are universally interchangeable based on standards.
- **Fast and reliable image processing:**
Make sure you have fast and reliable software that matches the processing speed of the image processing software and the process.
- **Integration into the automation system:**
Make sure that the image processing process can communicate with the production. Check which communication protocols are supported.

2.3.5 Fieldbus integration

An image processing system must work in sync with the production process. Image processing systems must support communication standards such as "PROFINET" or "OPC UA" to ensure network compatibility with external devices such as controllers, robots or host computers.

PROFINET

PROFINET, the international standard, uses Industrial Ethernet and enables real-time communication down to the field level.

With full use of existing IT standards, PROFINET enables high-performance motion control applications, efficient manufacturer-independent engineering and high machine and system availability in Industrial Ethernet.

Thanks to its flexibility, PROFINET offers new possibilities in system design, such as the use of any topologies and fail-safe networks, even via wireless connections.

PROFINET enables you to achieve high system availability through fast commissioning and efficient troubleshooting.

OPC UA Vision

In June 2018, the German Engineering Federation (VDMA) published an industry-specific "OPC UA Companion Specification for Robotics and Machine Vision Systems (OPC UA Vision)".

The aim is to create a horizontal and vertical integration capability. This enables the exchange of information with controllers or software systems such as MES, SCADA, ERP or a cloud.

A simple integration into all communication levels of the automation pyramid can thus be realized. This makes it easier to connect devices and applications from different manufacturers.

OPC UA enables client/server and publish/subscribe functionality.

OPC UA offers a comprehensive security concept based on authorization, authentication and encryption.

3 Image processing projects

3.1 Basics

In industrial image processing, information is obtained from digital images. This evaluation takes place internally in the image processing software system. The image processing process goes through different process steps.

The software examines specific properties, measures dimensions and compares the real test object with its specifications. Finally, a decision is made as to whether the object to be examined is rated "good" or "bad".

In contrast to the hardware components illumination and lens, image processing is a pure software application. Depending on the specific system and algorithms, you configure camera parameters and communicate with production.

Visual inspection

Industrial image processing is not a rigid sequence of techniques or algorithms. Rather, it is a collection of sensibly combined individual techniques. In the following, some of these individual techniques are briefly explained.

Figure 3-1

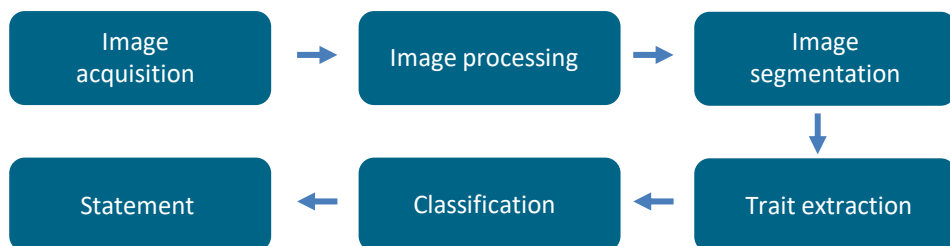


Image acquisition

The image is captured by a camera and transmitted to the IPC for processing. For this purpose, the test object is illuminated and then the image is discretized, quantized and finally stored via an image sensor.

Image processing

The image preprocessing serves to extract information better visually. Techniques are used to increase the contrast of images, eliminate image errors, suppress disturbances (noise components) or emphasize certain structures. Pay attention to carefully selected lighting and exposure. The loss of information in the sensor system cannot be restored afterwards.

Image segmentation

Through image segmentation it is possible to isolate objects from an image. For segmentation, methods are used which find objects in the image statically (work areas) or dynamically.

a. Static setting of work areas (ROI)

The region of interest is a subarea of a camera image that is being examined.

The prerequisite for manual examination is that the test object is always in the defined work area. Due to the smaller subrange to be investigated, the computing time is reduced, since fewer pixels have to be examined.

Define the work areas as small as possible. This saves research time.

b. Dynamic segmentation algorithms

The following algorithms are used to isolate objects dynamically from an image:

- **Binary segmentation:**
The image is divided by a threshold value into a binary image [0,1]. The object is formed on the basis of the two states. Histograms are suitable for defining threshold values in this procedure.
- **Model-based segmentation:**
The system searches directly for a predefined object. A similarity measure finds the object from the image. One algorithm that can be applied here is template matching.
- **Edge-based segmentation:**
This calculates edges or contours on an object. This makes it possible to uniquely identify objects based on their contour representation.
- ...

Characteristics extraction

Characteristic extraction determines the individual properties of objects. Characteristics can be, for example, circumference, area, position, orientation, linear dimensions, geometric shapes, distances or similarities. From this information, a classifier can later better determine which class it is.

Classification

In classification, an object is uniquely assigned to a class on the basis of its characteristics. In the case of a character set, a letter such as "A", for example, can be described unambiguously.

In recent years, machine learning has made it possible to program better classifiers than with previous methods.

By learning images, for example, it is possible with the deep learning algorithm to define classes from an existing set of images.

Statement

Based on the decision about the correctness of an existing class, decisions can be made in the manufacturing process. For example, parts could be classified into "good" and "bad" parts and thus improve the quality of the manufactured product.

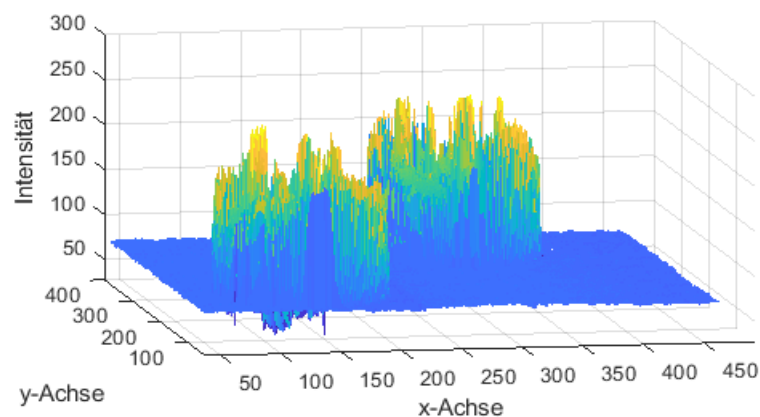
3.2 Example project

In the following, a simple example project will be used to show how cans can be gripped on a treadmill using a handling system.

1. Image acquisition

The image is captured by a camera and transmitted to the IPC for processing. The image is temporally discretized, quantized and finally stored. The greyscale image contains 256 possible brightness values with a grid size of 400*450.

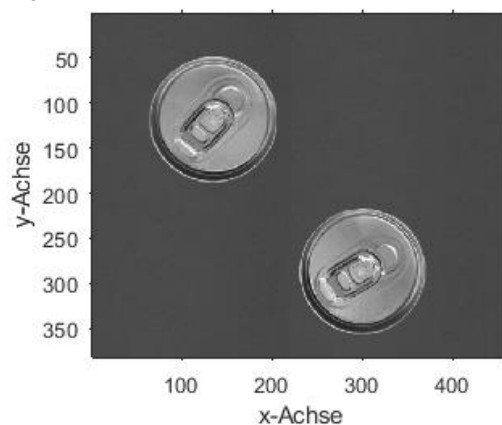
Figure 3-2



2. Image processing

The image is available in digital form. Preprocessing steps can be taken to increase contrast or suppress interference, for example.

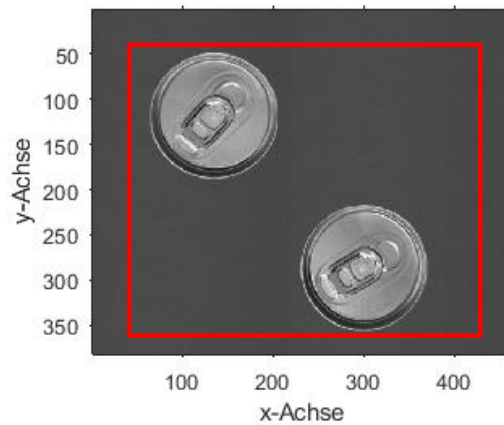
Figure 3-3



3. Set workspaces (ROI)

By setting work areas (ROI), only the region within the work area is examined more closely. This reduces the time required for processing. Fewer pixels are examined.

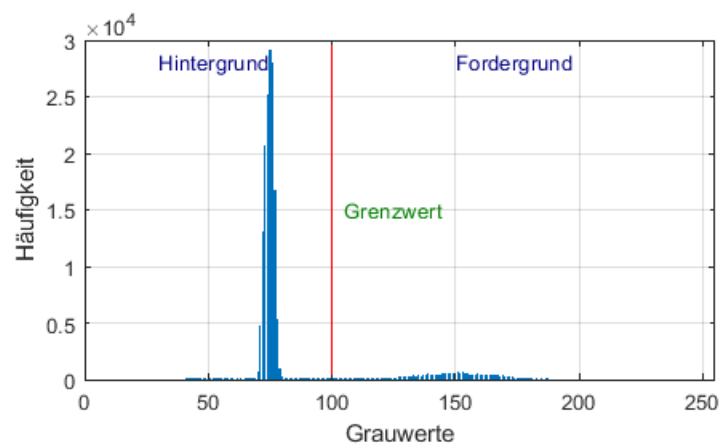
Figure 3-4



4. Create binary threshold

The histogram shows that the doses stand out clearly from the background. Therefore, a limit value is defined which divides the image into a binary image. With binary image processing, it must be ensured that this is a very fast process. However, it is sensitive to changes in lighting.

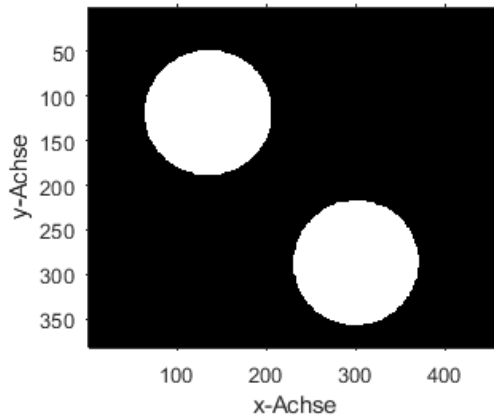
Figure 3-5



5. Segmentation

The cans are isolated from the image and extracted into objects. For this purpose, coherent pixel sets are combined to form regions.

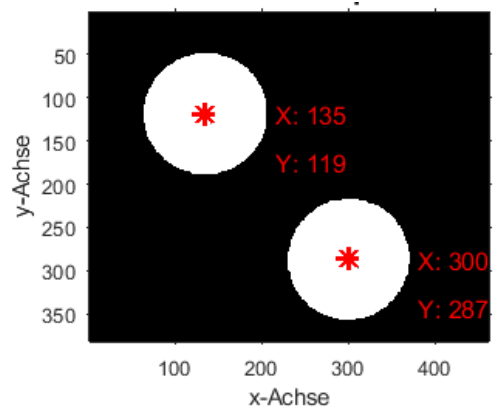
Figure 3-6



6. Characteristics calculation

After object segmentation, individual characteristics such as area, circumference, position, orientation or distances from each other can be measured. In the example of the handling system, the center of mass for the gripping process is calculated and then transmitted.

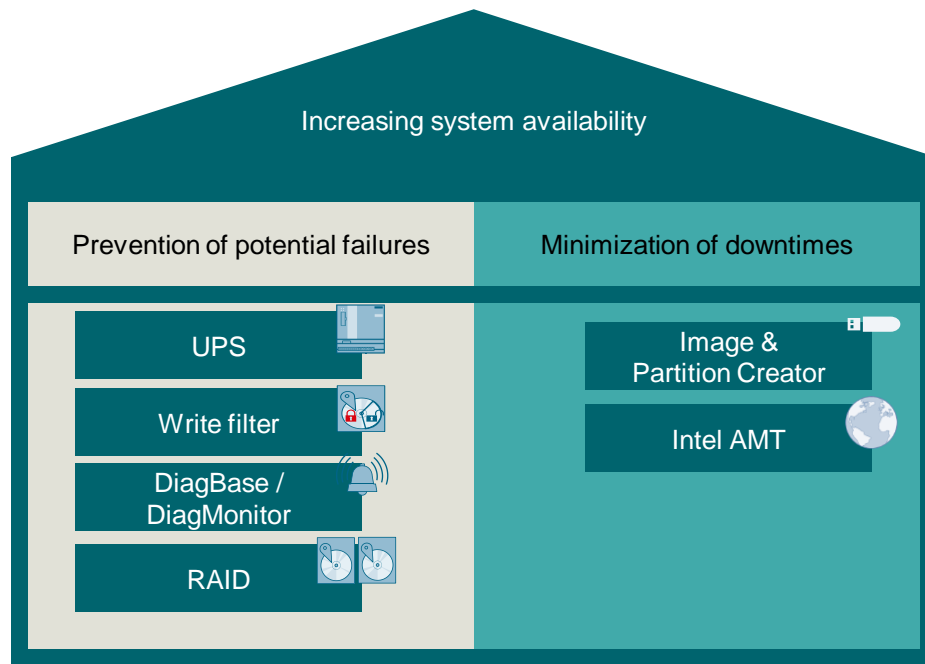
Figure 3-7



4 Added value through SIMATIC portfolio

In the following chapter you will be shown the added value of purchasing an industrial PC from Siemens AG for your industrial image processing solution.

Figure 4-1



The [TIA Selection Tool](#) facilitates the configuration and ordering of your SIMATIC IPC.

4.1 Diagnostics for SIMATIC IPCs

SIMATIC IPC DiagBase

The SIMATIC IPC DiagBase software is pre-installed on each SIMATIC IPC. With this software you can monitor your SIMATIC IPC locally and thus detect potential system failures in good time, plan maintenance measures and thus avoid plant downtimes.

With SIMATIC IPC DiagBase you can monitor the following IPC parameters:

- Temperatures
- Fan parameters
- Battery voltages
- Data storage
- Operating hours (total runtime of the system)

SIMATIC IPC DiagMonitor

The SIMATIC IPC DiagMonitor includes the functionality of the SIMATIC IPC DiagBase, and of other additional features.

It enables networked monitoring of different IPCs among each other. This can either be done from a central station or all IPCs monitor each other.

With the SIMATIC IPC DiagMonitor you can monitor your plants worldwide.

In case of an event, it is possible to send emails and SMS automatically.

Data exchange between different systems takes place via SNMP or OPC UA.

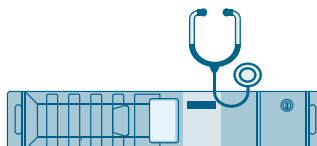
Thanks to the integrated web server, data can be accessed via a web browser from various devices such as smartphones or tablets.

Further information on diagnostics for SIMATIC IPC can be found on the product page [SIMATIC IPC DiagMonitor](#).

You will find the following application examples in Online Support:

- "Diagnosis of SIMATIC IPCs (with IPC DiagBase, IPC DiagMonitor, WinCC TIA Portal or WinCC V7)" under the contribution ID: [109478242](#).
- "Monitoring tasks from the Windows Task Scheduler with DiagMonitor" under the contribution ID: [109755236](#)

Figure 4-2



4.2 Maintenance and service case SIMATIC IPC Remote Manager

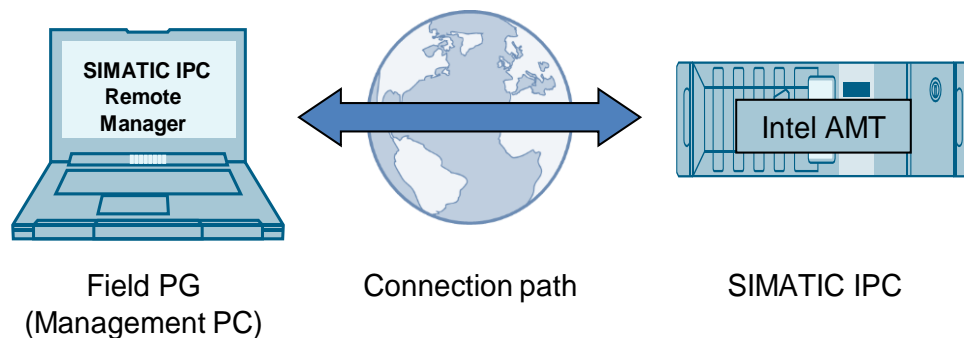
SIMATIC IPC Remote Manager

In industrial production downtimes cause high costs. In order to secure the production process, a quick response is required in the event of service. The simplest way without on-site use and yet fully operable with SIMATIC IPC Remote Manager.

The SIMATIC IPC Remote Manager is available for IPCs with Intel AMT. SIMATIC IPC Remote Manager requires neither a KVM switch nor additional cabling, but only an Ethernet connection and a power supply. Existing structures can be used in this way. An error in the system requires rapid action. Thanks to the remote control with SIMATIC IPC Remote Manager, you can react immediately, from anywhere in the world.

Communication is password protected and encrypted. You see and operate the remote IPC as if you were there. You can restart the SIMATIC IPC remotely, observe the startup behavior and access the BIOS. If BIOS or software updates are required, they can be enforced immediately.

Figure 4-3:



Further information can be found in the Siemens Industry Online Support:

- Application example "SIMATIC IPC with Intel® AMT: Diagnostics and remote maintenance of SIMATIC industrial PCs" [52310936](#)

4.3 Uninterruptible power supplies

Complex plants place high demands on efficiency, flexibility and reliability. If the power failure of the power supply in the inspection system is to be tolerated, an uninterruptible power supply is required. The broad SITOP product range supports you so that the power supply fits your requirements. The power supplies bridge 24V power supplies over seconds, minutes or hourly ranges in the event of a power failure. Various buffer modules are available as capacitors or batteries to bridge the downtime.

Note

Data stored in the volatile memory (RAM) when the voltage fails will be lost. If a write operation takes place on a storage medium at the moment of the power failure, there is a risk that the data will be incompletely written and thus unusable.

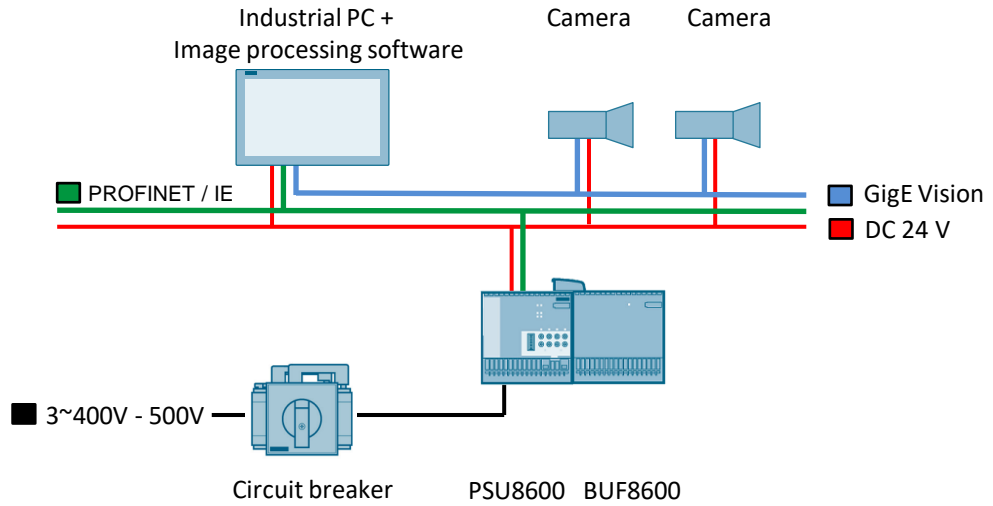
Further information on the SITOP product range can be found under the Product page SITOP (<http://www.siemens.de/sitop>).

Power failure up to the minutes Range

For power failures into the minute range, you can use the SITOP8600 modular power supply system with BUF8600 battery modules or the UPS500 uninterruptible power supply.

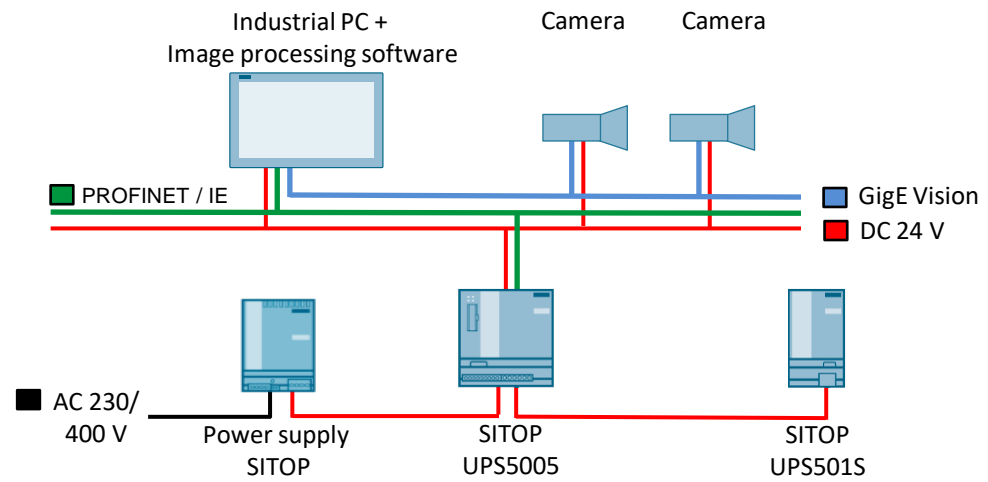
SITOP PSU8600

Figure 4-4



UPS500

Figure 4-5



4.4 Write filter

The "Enhanced Write Filter" (EWF, up to Windows 7) and the "Unified Write Filter" (UWF, from Windows 10) protect one or more partitions against unwanted write accesses or changes.

If EWF / UWF is activated, no more data is written to the disk or partition. This protects the data stored there from being overwritten.

Data from applications that nevertheless want to write to the data carrier are buffered in the main memory of the IPC.

This type of data protection is particularly suitable for systems where no changes need to be made to the system configuration after a certain point in time. A restart of the IPC causes the system to reset to its original state at the moment the write protection is activated.

Figure 4-8



With the software "SIMATIC IPC EWF-Manager" a free tool is available as download, with which the EWF can be configured comfortably.

Further information about the SIMATIC IPC EWF Manager can be found in the Siemens Industry Online Support:

- Download SIMATIC IPC EWF manager [50867677](#)

With the software "SIMATIC IPC UWF Manager" a free tool is available as download, with which the UWF can be configured comfortably.

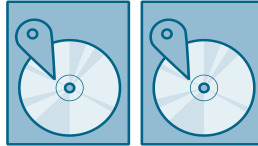
Further information about the "SIMATIC IPC UWF Manager" can be found in the Siemens Industry Online Support:

- FAQ How do I use the Unified Write Filter in Windows 10? [109759859](#)

4.5 Data availability RAID

In order to prevent the loss of data in the event of the failure of a data carrier, the interconnection of several data carriers has proven its worth. This creates a so-called RAID network. RAID stands for "Redundant Array of Independent Disk".

Figure 4-9



RAID systems are available in different configurations. Most RAID levels used are RAID 1 and 5.

Table 4-1

RAID Level	RAID 1	RAID 5
Feature of the RAID level	Mirroring	Parity
Minimum number of required data carriers	2	3
Number of defective data carriers without data loss	1	1

A RAID network also helps to prevent data loss in image processing solutions. IPCs contain special controllers that are capable of operating the built-in data carriers at RAID 1 or RAID 5 level.

If the RAID controller also masters the "hot swap" function, the defective data carrier can be exchanged during operation without interrupting the production processes.

SIMATIC IPCs with RAID options are pre-configured and immediately ready for use on delivery.

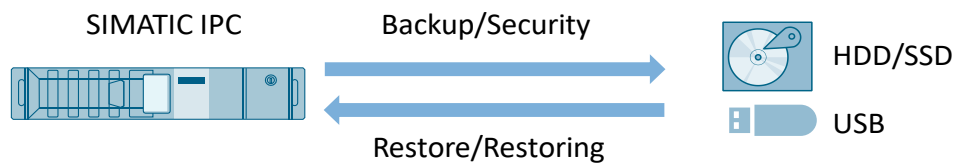
4.6 SIMATIC IPC Image & Partition Creator

With the SIMATIC IPC Image & Partition Creator, you reduce downtimes and increase the productivity of your SIMATIC IPCs using easy preventive data backup and efficient partition management. Data is backed up during the backup, restore, and restore processes. The backed up data itself is referred to as the backup.

Together with the SIMATIC IPC Remote Manager, it is possible to perform data backup and recovery conveniently and quickly, even via remote access.

More information about Image & Partition Creator can be found at the product page [Image & Partition Creator](#).

Figure 4-10:



5 Useful information

5.1 The Vision trade fair

The "Vision" is the world's leading trade fair for image processing.

The fair takes place every two years in Stuttgart. The complete spectrum of image processing is presented by many national and international manufacturers.

Further information can be found under the following link:

<https://www.messe-stuttgart.de/vision/>

5.2 Customer references project

Plasmo Industrietechnik GmbH

Quality assurance solutions for automated metalworking production are the core business of Plasmo Industrietechnik GmbH.

With its techniques and procedures, the company ensures that even in complex welding processes, the welds are carried out precisely.

The system evaluates the information from up to four sensor systems and image data - which is why Plasmo Industrietechnik GmbH also requires a particularly powerful, versatile and absolutely reliable industrial PC for its solutions.

These pages are only available in German. You can find more detailed information under:

- Blech online
<https://www.blechonline.de/wie-schweissnaehte-zuverlaessig-kontrolliert-werden>
- Article on the homepage of Plasmo Industrietechnik GmbH
http://www.plasmo.eu/eu/wp-content/uploads/2016/05/Titelstory-Siemens-mpa-4-2018-s08_s11.pdf

6 Appendix

6.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

<https://support.industry.siemens.com>

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:

www.siemens.com/industry/supportrequest

SITRAIN – Training for Industry

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

www.siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

<https://support.industry.siemens.com/cs/ww/en/sc>

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android:

<https://support.industry.siemens.com/cs/ww/en/sc/2067>

6.2 Links and Literature

Table 6-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the entry page of the application example https://support.industry.siemens.com/cs/ww/en/view/109766012

6.3 Change documentation

Table 6-2

Version	Date	Change
V1.0	08/2019	First version