Expert image processing solutions for the medical technology and pharmaceutical sectors

Solution Excellence for Your Vision

VMT
PEPPERL+FUCHS

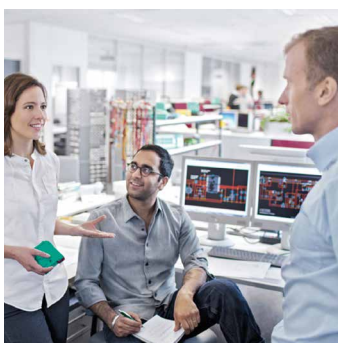
As a global image processing specialist, we know that you as our customer accept no compromises when it comes to the quality of your products. Our mission is to provide customized image processing and automation systems for optimal support.

VMT Bildverarbeitungssysteme GmbH is a company in the Pepperl+Fuchs Group and therefore part of a world leader for industrial sensor systems and for technologies in explosion protection. Innovations and dialog with our customers have shaped this family company since it was founded in 1945.

Pepperl+Fuchs stand by a great variety of industrial sensors of all operating principles right up to ultrasonic sensor systems for highly complex applications. VMT's identification systems, vision sensors and image processing systems round off the range of products and solutions.

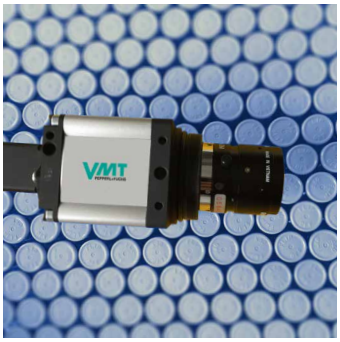
Application-oriented solutions for areas at risk of explosion include isolated barriers, HART interfaces, remote I/O systems, fieldbus infrastructures and complete individual solutions. Operating and monitoring systems, level measurement technology and separator warning devices complete the product range.

With revenue of more than 500 million euros and more than 5,600 employees, Pepperl+Fuchs is ideally represented and established around the world



Expert image processing solutions

Medical technology and pharmaceutical sectors



VMT Bildverarbeitungssysteme GmbH has been supplying turnkey image processing solutions to the medical and pharmaceutical sector for more than 20 years – solutions that you can rely on!

As a specialist operating on a global scale, achieving the highest quality is our top priority. With the experience of hundreds of successful projects behind them, our experts support you from the initial idea to the entire planning and life cycle of your system.

Together with our various cooperation partners in machine construction and automation, we also deliver integrated solutions from a single source.

VMT's image processing solutions naturally meet the industry's high standards as well as the requirements of 21CFR Part 11, cGMP and GAMP.

Ten good reasons to work with VMT

- Our experts' high level of commitment
- Consultation right from the first second
- Project support through to commissioning
- Comprehensive industry sector knowledge and application know-how
- Developments with a practical orientation
- Integrated solutions from a single source
- Product changes carried out quickly
- Training and workshops
- Service hotline
- Service around the world and on-site presence

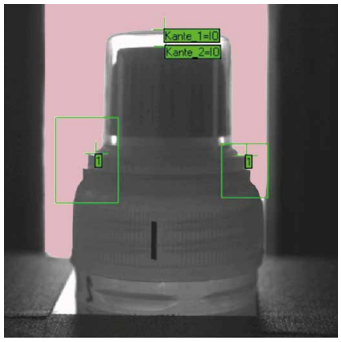
Fiber bundle inspection application

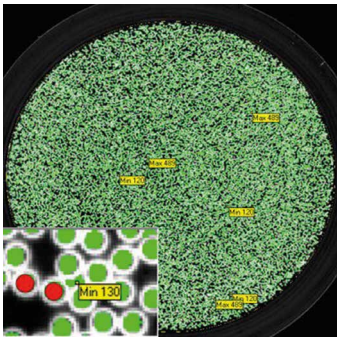
Medical filters are made of fiber bundles with thousands of individual fibers. Filters are surrounded at both ends by a filler material and are cut during the procedure. If the cutting quality of the blade decreases, this material can block the fibers, causing the filter to lose optimal effectiveness.

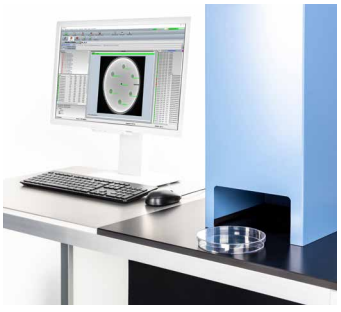
The fully automated inspection must identify and count all individual fibers, and where applicable, detect any obstructed fibers. If the number of obstructed fibers is above a defined value, or if these flaws are badly geometrically distributed, the filter is removed from production. Additional analysis of fiber geometry for narrowed, flattened or deformed fibers requires an image processing system with the highest possible precision.

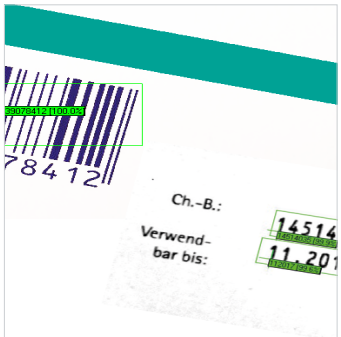
With lighting optimized to the physical characteristics of the filter, high-resolution cameras and special detection algorithms, the VMT-IS/V image processing system achieves exceptionally high detection reliability with maximum availability.

In addition to the cross-section inspection, many further tests are carried out several times in the assembly process for medical filters (e.g. installation inspections, geometry inspections, sealing tests, fiber bundle inspections etc.). VMT image processing solutions from this renowned manufacturer are now installed around the world; here, worldwide support was a top priority as well as the actual solution; VMT can effortlessly meet both requirements through their network of locations.









Inspection

Assembly inspection and quality control

- Type recognition
- Parts recognition
- Presence
- Position detection
- Dimensional accuracy
- Fission control
- Parts feeding
- Precision assembly

Assembly inspection

- Type verification
- Completeness
- Form and geometry
- Colors and surfaces
- Particle inspections
- Lock testing
- Sealing inspections
- Active ingredient tests

Quality control

- Completeness
- Code reading (1D/2D)
- Character recognition
- Logo recognition
- Print image inspection
- Container inspection
- Serialization
- Track & Trace

Packaging inspection

Inspection focuses on the monitoring of key product characteristics such as geometry, shape, color and surface structure.

Along with final product testing, in-line inspection is often necessary for primary or secondary packaging, for example as part of an assembly inspection. The typical quality testing application areas include:

- Injection systems
- Medical filters / dialysis filters
- Vials, cartridges, cannulas, ampules and syringes
- Tablets and capsules
- Tubular and infusion bags
- Particles, fibers, glass splinters and impurities
- Stoppers, caps and lids
- Containers

For these tasks, the VMT-IS/V image processing system offers a variety of prefabricated modules for rapid and reliable testing of your product and easy system integration.

Thanks to the longstanding experience of the VMT experts in all areas of industrial image processing and automation, quick access to proprietary sensor and software development, and the close integration in a network of partners in the areas of optics, lighting technology and machine construction, VMT is also a trusted partner particularly for complex tasks.

VMT IS/V - software for all tasks

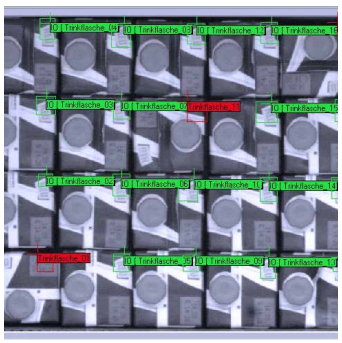
VMT-IS/V is a modern, modular image processing and automation software that provides a quick solution for your application and is easy to configure at the same time.

The "Configuration instead of Programming" principle was consistently implemented for the user. On the basis of so-called test plans, even complex image processing applications are developed and clearly optimized step by step. In the basic version, VMT/IS-V already provides a variety of ready-made algorithms and libraries for a wide variety of tasks.

The system is parameterized by means of graphic tools. Typical sources of error are excluded by ready-made user dialogs, interface modules, archive functions for image data, results and statistic functions. And VMT-IS/V can still be easily extended using plug-in modules. At all times, applications can also be modified and extended later.

Extremely efficient recognition is ensured by the pattern recognition processes integrated in VMT-IS/V. By means of so-called neural networks, many recognition tasks can be automatically learned on the basis of image and object data. When desired or necessary, system optimizations are possible through follow-up training with process data.

VMT-IS/V can be used both on special industry PCs running on the Microsoft Windows operating system and on many embedded PC variants.



Algorithms

- Inspection
- Type recognition
- 2D/3D position detection
- Form and geometry
- Color testing
- Surface testing
- 1D/2D code reading
- OCR/OCV text reading

Interfaces

- Line cameras
- Surface cameras
- 3D sensors
- Other sensors
- Lighting systems
- PLC communication
- Fieldbus interfaces
- Robot communication

Functions

- User administration
- Online protocol
- Logging data and results
- Audit trail
- Remote maintenance
- Validatable as per FDA 21 CFR Part 11

Auto ID

Code and text reading

Automatic verification or identification of product, date and batch codes is not only necessary for the traceability of pharmaceutical and medicinal products as well as for protection against product counterfeits, it is in many cases mandatory from a legal point of view.

Designed for the highest recognition security, the VMT-IS/V camera-based image processing system has all the prerequisites necessary to automatically identify 1D/2D codes, plain text, graphics and logos. Fixed and variable data are securely read and archived by means of sophisticated OCR/OCV algorithms (optical character recognition or verification). Furthermore, print quality can be measured by the individual evaluation of texts and printed images. Of course, multi-code labels can also be processed even if these contain codes and plain text.

Particularly for highly fluctuating processes in which position, shape, color and orientation of the printed material changes frequently, maximum availability can still be guaranteed by the image processing built into VMT-IS/V e.g., for position and color recognition and by selecting special optics and lighting. And this is of course also the case for high conveying speeds, the shortest cycle times and complex objects with large surfaces.

VMT-IS/V is also validatable for all applications in the auto ID area (compliant with 21CFR Part 11 corresponding to the FDA standard).

In-line label inspection applicatio

A solution for label inspection on an existing production line was requested at a renowned manufacturer of diagnostics. A complete label inspection was to be carried out before dispatch with the integration of a new labeler to the line in order to avoid erroneous labels going into circulation and traceability of the product being at risk.

The default values for the respective label are transmitted over an Ethernet interface. Using an image processing system, data matrix codes, bar codes as well as material numbers and batch codes in plain characters have to be detected, and print quality checked as well.

The problem was successfully solved with the VMT-IS/V image processing system. The IP system receives its start signal via a digital interface. After imaging, VMT-IS/V checks the contents that have been read with the default values using the available DMC and bar code decoders as well as the extremely efficient OCV algorithms, and reports the test result to the PLC.

Introducing the upstream label check now provides a 100% guarantee for our customer that labeling and product tracking are correct and qualified. In addition to the most reliable reading performance possible, an important prerequisite for our customer was validation of the entire system according to FDA 21 CFR Part 11. Among other things, VMT-IS/V has all the necessary prerequisites for user administration and audit trail functions

Validation

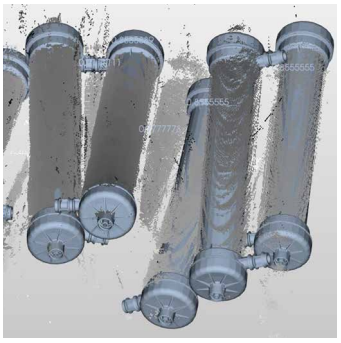
Strict legal requirements in the medical and pharmaceutical industries necessitate extensive quality control of medical devices and medications. The validation and integrity of process data is just as regulated as the verification of packaging information.

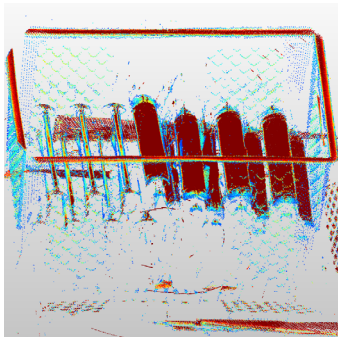
Flexible testing solutions for the traceability of products and their ingredients throughout the process are the answer to existing and future legal requirements.

Image processing solutions from VMT, and the VMT-IS/V system in particular, meet the industry's high standards, particularly the requirements of 21CFR Part 11, cGMP and GAMP. VMT-IS/V offers among other things user administration with various access levels, and enables documentation and traceability of all user actions with time stamps in the audit trail.

If desired, VMT offers comprehensive support for the qualification process, e.g. by creating qualification plans with test specifications as well as risk analyses for hardware and software. Many satisfied customers prove the consistent implementation of these processes and successful auditing.

Naturally, our trained staff will support the qualification phase during the entire development and product life cycle, and also accompany our customers for on-site qualification





Position detection/ robot vision

Many assembly and handling tasks require detecting an object's precise position and alignment, and transmitting this position data to an assembly system or a robot. The parts to be grasped might be located in a magazine, on a conveyor belt, arranged in special containers, or jumbled in boxes (“bin picking”).

The VMT position detection systems designed for all industrial tasks have already proven themselves a hundred times. Position detection of construction parts can be done both in a plane (2D) and in space (3D). Depending on the task definition, stationary cameras, robot hand cameras or 3D laser sensors (e.g. VMT LineRunner or SpinScan 3D) are used in connection with the VMT-IS/V image processing system.

For highly precise, robot-guided assembly processes, VMT offers best-fit jointing systems as well. Here, image processing sensors or laser sensors guide the assembly system to a target position with extreme precision. Significantly higher precision and reproducibility compared to conventional assembly systems are achieved by constant measurement of the current and the target positions and control of the manipulator.

All the solutions mentioned are supported for the broadest range of robot controls, technology packages and fully automated calibration procedures using standardized protocols.

Position detection systems can of course be combined with other inspection tasks, e.g. for quality control, verification of component parts or auto ID applications.

Parts handling application

An important manufacturer of medical filters requested a robot-supported handling solution for the automation of several production cells. Filter housings that lie randomly in transport boxes were to be detected, picked up by a robot and conveyed to a given position on the production line. An additional challenge lay in the specific material properties (transparent plastic) as well as in the shape of the unfinished parts.

First of all, the detection tasks could be successfully solved using the VMT SpinScan 3D sensor system The rotating sensor placed over the transport box generates a precise 3D image of the filled box. Container position and edges are then fully automatically reported using the VMT-IS/V image processing system. Based on the previously scanned 3D pattern profiles or CAD data of the components, these are then automatically detected in the recorded elevation profiles.

Which of the detected components that can most easily be removed is then assessed, and the optimum grip point for the robot is determined. The grip point is reported on the robot control panel only after an additional check of whether the robot could collide with the transport box or other components when removing the part.

The commissioning phase in this project could be kept very much to a minimum by the technology packages available for many robot controls. The solution that was perfectly tuned to the production logistics of the customer could be copied in many comparable applications. For our customers, it is above all the cost effectiveness and reliability of the complete solution that have been and are decisive.

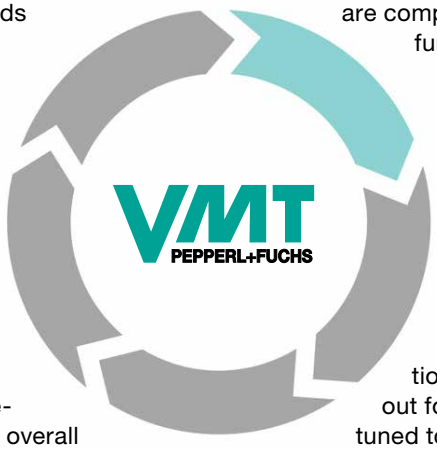
VMT — Professional support for your system throughout its entire life cycle

Service

Optimum service in all planning and life cycle phases of your system is a given for us. This begins with fast accessibility around the world and includes many further services such as training, spare parts provisioning, system extensions, optimizations and much more. Irrespective of whether it is a question of general sector knowledge or specific application know-how, our customers are in good hands with us

Task, analysis and design

Whether it's new or existing machines or systems, the basis for a successful implementation of projects is laid in a sound needs analysis. Taking deadlines and budget into consideration, an automation concept is developed which integrates the experience on both sides. Consideration of guidelines and standards goes without saying; the VDI/VDE 2632 guidelines are complied with, for example, for requirements and functional specifications.



Integration, commissioning and optimization

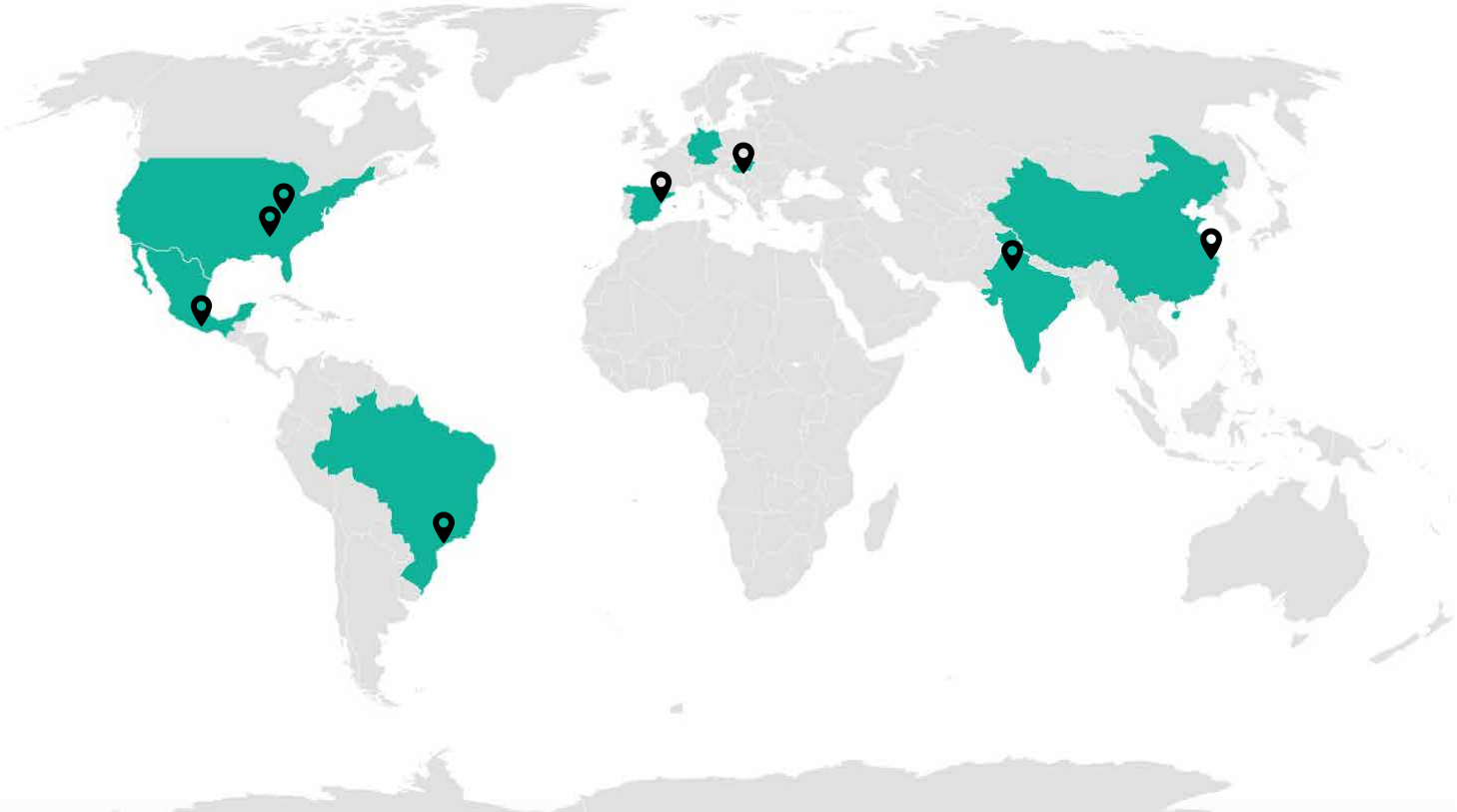
Experienced project managers and technicians from VMT plan, install and integrate the image processing systems in the overall system. Whether it's pre-assembly or end commissioning, whether its system support, training, documentation or validation, our specialists will support you professionally in all phases right up to acceptance of the system.

Solution and performance

On the basis of the requirements and functional specifications, detail planning is carried out for all image processing tasks that is optimally tuned to the overall system. Hardware and electrical planning are done using state-of-the-art CAD systems. The application software is developed using VMT-IS/V. Where appropriate, critical applications are secured using a previously carried out feasibility study. Our proven project management ensures permanent transparency in the progress on the project, close coordination with partners and an efficient progress and budget control.

Service/ Support

Around the world



VMT operates globally with regional branches in Europe, America, Asia and Africa. Particularly in the future market of China, we have our own regional branch and an extensive sales and service network.

With VMT, you not only have the certainty that you have absolutely high-tech products but also benefit from a broad range of services in consulting, support, training and after-sales service.

VDMA

TÜV SÜD ISO 9001

Solution Excellence for Your Vision

VMT Vision Machine Technic Bildverarbeitungssysteme GmbH is your leading automation partner for machine vision turnkey solutions worldwide. VMT® develops and supplies customized machine vision, robot vision, and laser sensor systems for all industrial sectors using our self-developed state-of-the-art hardware and software products. As a professional consultant, VMT® provides objective solutions tailored to individual applications. Our technical services cover the complete life cycle of your machine vision solution, including planning, commissioning, installation, and system integration as well as training, maintenance, and upgrade services. With more than 25 years of experience in industrial machine vision applications, you can be confident that VMT® will provide proven solutions for your operation that nobody else can match.

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