

Press release

More color, more detection reliability!

Whether for blow fill seal containers, vials or prefillable syringes: HEUFT will be exhibiting the latest solutions for the highly precise checking of the product safety and packaging quality of pharmaceuticals at the ACHEMA 2022 exhibition in Frankfurt am Main from 22nd to 26th August.

It will be colorful at the ACHEMA: *MCIP*, our new *Multi Color Image Processing* puts blow fill seal ampoule strips, blow fill seal infusion bottles and now also vials in the right light in order to highlight impurities, product faults and packaging defects even more clearly. At just one single inspection station, various lighting scenarios in different colors are combined and the individual color channels are calculated with each other.

Whereas previously several cameras were required to inspect pharmaceutical primary packaging in multiple colors, for example in both incident and transmitted light, thanks to *MCIP* this can now be done from one and the same perspective, saving space, components and resources.

Visitors to the ACHEMA exhibition can see for themselves at Stand 3.2/C57 how sustainably this improves the optical detection of foreign particles and many other critical faults: the HEUFT *spotter^{II} BFS*A which will be exhibited live there already uses the smart image processing solution developed in-house for the blow fill seal ampoules inspection.

The same applies to the HEUFT *spotter^{II} BFS*B for the 100% inspection of blow fill seal infusion bottles and recently also to the HEUFT *spotter^{II} PHS* which takes filled vials from the base to the crimp cap under the *MCIP* magnifying glass. Both of these are presented on our new type of virtual device stele where, among other things, original feature and detection images generated with the innovative technology are clearly displayed.

In addition two current solutions will be demonstrated there with the HEUFT *InLine^{II} IS* and the HEUFT *Syringer* which check vials and other pharmaceutical containers as well as pre-fillable syringes before they are

filled and thus ensure in the long term that valuable products only end up in fault-free containers – an effective protection against unnecessary wastage of medicines!

Press Release

Multi Color Image Processing: Now it's getting colorful!

Self-invented, freshly registered for a patent and already proven in practice: the innovative HEUFT MCIP image processing solution puts products and pharmaceutical primary packaging materials to be inspected in the right light in a resource-saving manner.

Each product has specific characteristics which must be taken into account during the inspection. This applies in particular to primary containers used by the pharmaceutical industry with their wide range of very different materials and formats. Accordingly, it is challenging to optimally match image processing to their typical characteristics as well as to the defects that absolutely must be detected. And to do this as cost-effectively as possible, saving time, energy and space, with less effort, equipment and components.

Our newly developed *Multi Color Image Processing (MCIP)* which was registered for patent at the beginning of February 2022 masters these challenges – thanks to a novel combination of universally controllable lighting scenarios in different colors with image processing algorithms adapted to them!

Originally developed for the HEUFT *spotter*^{II} BFS devices for the 100% all-round inspection and integrity testing of filled blow fill seal ampoules and infusion bottles the innovative procedure has already proven its impressive detection accuracy in various customer installations and will now also be integrated into other in-line inspection systems for the pharmaceutical industry in order to present the most varied containers in the best possible light.

Directly integrated into the intelligent HEUFT *reflexx*^{A.I.} camera the MCIP combines different illumination principles such as bright and dark field illumination in reflected and transmitted light at only one inspection station. Each type of illumination used has a different color, so that the resulting information can be spectrally separated from one another in the further

course.

A wide variety of features and characteristics can thus be extracted from a single image by calculating the individual color channels accordingly. Where up to now transmitted and reflected light applications were only possible with several cameras at different positions from different perspectives this can now all be achieved in a resource-saving and space-saving manner with only one detection unit: the HEUFT *reflexx*^{A.I.} camera obtains all the information at once on the spot and calculates it with each other with pixel accuracy so that they can be correlated considerably better in order to be able to identify critical faults even more clearly.

Thanks to specific illumination principles, this is now also possible during the complete inspection of vials with liquid or lyophilized products. The HEUFT spotter II PHS can now also clearly distinguish genuine faults from harmless objects without any additional classification.

Adapted to their specific characteristics as well as to all possible critical faults which must be detected the image processing method, for which a patent has just been applied for, simply puts every pharmaceutical primary container into the right coloured light!

Press release

BFS ampoule inspection: gapless and multicolored

The HEUFT *spotter*^{II} *BFSA* has been developed in particular for the 100% complete inspection of blow fill seal ampoules filled with small volume parenterals and other liquid preparations and now achieves full coverage and even more detection accuracy thanks to the newly integrated *Multi Color Image Processing (MCIP)*.

The HEUFT *spotter*^{II} *BFSA* achieves a complete all-round inspection of every single aseptically produced and filled primary packaging material with adaptive lighting as well as smart optomechanics, image filtering and subtraction. He identifies deformations, missing or excess packaging components, soiling leaks, scratches, cracks, scores and inclusions in the material of the polypropylene or polyethylene containers just as reliably as deviations in the filling quantity and colour of the products and foreign objects inside them.

The latest HEUFT *reflexx*^{A.I.} cameras and the new *MCIP* which has already proven itself in practice increase the detection accuracy considerably. This is because different lighting scenarios in different colors can now be smartly combined and calculated at each individual detection station. For example, from one and the same perspective, the ampoule strips can be inspected in multiple colors in both incident and transmitted light, saving components and resources.

And not just top-down and bottom-up. The compact HEUFT *spotter*^{II} *BFSA* additionally realizes an optical complete inspection of the side walls and closures of each individual ampoule in efficient linear operation for full coverage. The transport belt which clamps the ampoule strips and guides them straight through the device is thus constructed in an extra alternating manner: In the infeed, they are gripped at the top to inspect their entire lower part up to the bottom edge, and then at the outfeed they are gripped at the bottom so that the entire upper half is covered up to the caps.

Intelligent optical technologies and the smart HEUFT *reflexx*^{A.I.} image

processing ensure full detection reliability. A particular illumination is integrated into the modular system especially for the reliable detection of ampoule strips with greasy contamination. Inverted evaluation images, for example, make black spots and other inclusions everywhere in the SVP container material clearly and distinctly recognizable as white dots on a black background.

Matched to their specific characteristics as well as to all possible critical defects that must be detected, the MCIP, for which a patent application has recently been filed, puts the primary packaging material in the right colored light to reliably find even the smallest foreign particles in the ampoule and clearly distinguish them from harmless deviations. And this even when the faults are located in the filling line area which is difficult to see.

Based on the current HEUFT *SPECTRUM*^{II} platform the linear compact system not only achieves the highest precision during the tracking, in-line inspection of up to 30,000 blow fill seal ampoules per hour and the reliable rejection of faults with the most varied rejection systems but also a fully automatic adaptation of the trigger photoelectric sensors, cameras, lighting units and transport belts to different container sizes. Program and format changes can thus be carried out without tools and without any human intervention. The HEUFT *NaVi* audiovisual user guidance system ensures simple, fault-free operation.

The HEUFT *spotter*^{II} *BFSA* complies with the FDA's 21 CFR Part 11 regulations with user-related access rights and a detailed audit trail documentation of all operating and process information. A connection to databases and MES systems enables the real-time transfer, processing and complete archiving of detection images, batch and production data. There is a network connection to the HEUFT *TeleService* for secure remote diagnosis and maintenance. Basic GMP and GAMP5 requirements are therefore consistently fulfilled by the newly developed but already field-tested system for the one hundred percent complete inspection of bundled ampoule strips.

Press release

Infusion bottle inspection: fault-free and leak-proof

The HEUFT *spotter*^{II} *BFSB* now achieves a clear plus in precision during the complete inspection of blow fill seal ampoules with *Multi Color Image Processing (MCIP)* – and at the same time checks their tightness in order to detect even the smallest leakage which threatens the microbial purity of their contents.

MCIP now also puts blow fill seal infusion bottles in perspective to more clearly highlight contamination, product defects, and packaging defects. The HEUFT *spotter*^{II} *BFSB* achieves full precision during the full-coverage in-line inspection of every product thanks to smart multi-colour illumination, opto-mechanics, image filtering, subtraction and processing which are adapted to different categories of faults. The device can additionally detect a drop in their internal pressure caused by leaks in the same operation and thus reliably detect and reject leaking infusion bottles with potentially microbially contaminated contents.

Directly integrated into the intelligent HEUFT *reflexx*^{A.I.} camera developed and manufactured in-house, the *MCIP* combines different illumination principles at just one inspection station each. Because each type of illumination is carried out in a different color the information obtained can be separated spectrally from each other so that the most varied features and characteristics can be worked out much more clearly from only one single image by means of smart, pixel-precise calculation of the individual color channels. Whether black spots in the material of the 100, 250, 500 or even 1,000 milliliter packaging for Large Volume Parenterals (LVP) or the smallest foreign particles in the product: Critical defects can be found even better and distinguished from harmless deviations. The same also applies to scratches, cracks and leaks, among other things.

Even more safety is provided by the additional integrity testing and leakage control. For this purpose, the containers are guided in a belt drive that exerts a precisely definable force on them. Special sensors measure their

internal pressure twice so that – irrespective of the electrical conductivity of the product contained – a drop in pressure caused by leaks can be reliably identified. Clamped in this way, the infusion containers "float" above the optical module for bottom inspection in the center of the device, so that this area can be inspected completely without gaps, where defects, foreign particles, and defective bottle hangers, among other things, can be identified with unrivalled reliability using *MCIP*.

The modules for optical 360° closure and sidewall inspection, which also detect torn sealing foils, deformed or misoriented closure toggles, and underfilling or overfilling, are accommodated in the infeed and discharge, where the blow fill seal infusion bottles are not yet or no longer transported in the belt drive. In this way their full volume is covered without blind areas.

Based on the current HEUFT *SPECTRUM*^{II} platform the linear system not only achieves the highest precision during container tracking, in-line inspection and rejecting faults with the most varied rejection systems but also a fully automatic adaptation of the trigger photoelectric sensors, cameras, lighting units and transport belts to different sizes of blow fill seal infusion bottles. Program and format changes can be carried out without tools and without any human intervention.

The first HEUFT *spotter*^{II} *BFSB* systems installed inspect up to 12,000 infusion bottles per hour. The HEUFT *NaVi* audiovisual user guidance system ensures simple, fault-free operation. The modular system fulfils the FDA's 21 CFR Part 11 requirements with user-related access rights and detailed audit trail documentation of all operating and process information.

A connection to higher-level databases and MES systems enables real-time transmission, processing and complete archiving of detection images, batch and production data. There is a network connection to the HEUFT TeleService for secure remote diagnosis and maintenance. The HEUFT *spotter*^{II} *BFSB* with the newly integrated MCIP thus fulfils basic GMP and GAMP5 requirements.

Press release

Full vial inspection: innovative and powerful

The new Multi Color Image Processing (MCIP) is also integrated into the proven HEUFT *spotter*^{II} PHS for even more detection accuracy during the optical inspection of filled vials. Together with pulsed X-rays for the detection of foreign particles in the lyophilisate amongst other things as well as laser technology for head space analysis it thus offers the suitable detection method in one device for practically every critical defect.

MCIP will also be used in the HEUFT *spotter*^{II} PHS in the near future. Visitors to theACHEMA exhibition will be able to experience the effects of this in advance at Stand 3.1/C57 – on a cyber-physical device stele which they have constructed themselves. Using original feature and detection images which have been generated with the aid of the innovative image processing solution during the vial inspection it becomes directly clear how the resource-saving combination of different illumination scenarios with only one HEUFT *reflexx*^{A.I.} camera in each case and the smart calculation of the individual color channels highlights the most varied features and properties of vials filled with liquid or lyophilized contents even more clearly.

Particles inside them and inclusions or defects in their glass are thus reliably detected even when they are located in areas that are difficult to see, such as close to the fill line or directly on the lyo cake. Without additional classification, they can be clearly distinguished from harmless objects such as water droplets or product buildup on the inner walls of the respective injection bottle.

For this purpose, MCIP realizes a particularly homogeneous illumination. Thanks to appropriate image processing algorithms, the detection image is transformed into a feature image on which interfering container or product structures recede into the background, so that minute defects can be located very precisely. Among other things, otherwise inconspicuous scratches and defective flanging on the caps of the containers are thus

much easier to see with *MCIP*.

The innovative image processing solution developed in-house puts the glass injection bottles in the right light and thus increases the already impressive performance of the HEUFT *spotter*^{II} *PHS* during the camera-based base, sidewall and crimp cap inspection even more. Interference structures such as scratches on the beading edge are just as clearly detected as faulty or incomplete beading directly underneath so that vials which are not securely sealed can always be reliably rejected.

The straight-line system from the highly automated HEUFT *SPECTRUM*^{II} modular system also detects glass splinters and other foreign objects of high density which are concealed in non-transparent packaging and pharmaceutical products such as lyophilizate using lifetime-optimized pulsed X-rays. And laser technology for head-space analysis (HSA) detects leaky sealed containers whose oxygen content is too high.

So for virtually any application, the full-featured vial inspector, which meets basic FDA, GMP, GAMP5 and 21 CFR Part 11 requirements, offers just the right detection technology – and will soon go one better with *MCIP*!

Press Release

Prefillable syringe inspection: precise and smart

From a bent needle to a puncture of the needle protection: the HEUFT *Syringer* simply finds more during the inspection of prefillable syringes with a further developed pulsed X-ray. A smart additional optical system will be added shortly – with the potential for further, even more precise inspection approaches in one and the same operation.

During unrivalled low levels of radiation, lifetime-optimized pulsed X-ray inspection identifies soft and rigid needle shields (SNS / RNS) pierced by the injection needle, bent and deformed needles, or even defective, incorrectly assembled, non-secure Luer lock screw adapters and tamper-evident closures of disposable syringes. It also enables precise verification of the correct assembly of prefillable syringes.

Since no continuous beam is emitted, but only millisecond X-ray flashes, the inspection of up to 1,200 syringes per minute is both gentle and precise. At the same time the service life of the pulsed X-ray technology developed and manufactured exclusively by HEUFT has increased considerably – and with it the reliability of the compact HEUFT *Syringer* which can be easily integrated into packing and packaging machines for prefillable syringes and is alternatively also available as a stand-alone system.

An innovative additional optical system which optimally complements the pulsed X-ray will soon be available in order to reliably detect even micrometer-small deformations at the needle tip, so-called needle hooks: an intelligent HEUFT *reflexx A.I.* camera developed and manufactured in-house examines the needle tips from above even before the protective covers are fitted. The special light scattering of the adaptive LED illumination used for this makes even the smallest deviations in shape visible in one and the same operation.

The same applies to numerous other critical and cosmetic defects, such as prefillable syringes with missing or incorrectly positioned protective caps. Even when these are made of soft, easily deformable elastomer, their outer

contours can be much better determined optically to verify their presence, integrity and correct application. Even cracks and defects on soft and rigid-needle shields can be reliably detected by newly connectable HEUFT *reflexx*^{A.I.} cameras in which both the LED illumination and the learning-capable image processing are directly integrated. This means that the HEUFT *Syringer* will soon be able to check even more safety and quality features of such prefillable syringes.

The combination of pulsed X-ray and smart optics which is exclusively available during HEUFT therefore offers potential for further, even more precise inspection approaches. That which remains hidden from one technology makes the other visible. And vice versa.

Press release

Empty vial inspection: uncontaminated and safe to fill

The HEUFT *InLine*^{II} IS inspects vials and other pharmaceutical primary packaging materials even before the valuable medicine enters. With innovative optics and smart HEUFT reflexx A.I. image processing the compact, highly automated empty container inspector achieves full coverage and precision in gentle and efficient linear operation.

It has long been mandatory for vials filled with parenterals, the one hundred percent integrity testing of each individual full container, as implemented by the HEUFT *spotter*^{II} PHS for example. The HEUFT *InLine*^{II} IS goes one step further. The modular system inspects all the vials completely without gaps even before they are filled. Injection bottles which are contaminated with the smallest glass splinters due to glass breakage in the hot sterilization tunnel for example are detected and safely rejected before the expensive product enters – effective protection against a senseless waste of medicine!

In addition to the gapless optical base inspection with high-performance cameras and adaptive, homogeneous illumination, which even makes transparent and reflective foreign substances and defects visible, the new generation empty container inspector also inspects the side walls and the neck finish area with full coverage and without blind spots. The individual vials are specifically rotated for this purpose using servo technology and aligned exactly correctly at each individual detection station.

The smart HEUFT *reflexx*^{A.I.} image processing system developed and manufactured in-house combines and analyzes the detection images in real-time. It effectively filters out material structures of packaging material made of smelted glass such as knurling marks or embossing so that scratches, cracks, inclusions, glass mandrels, "monkey swings", chipping, delamination, contamination and thermal cracks are also reliably detected in these container areas.

During a change of type the height and width of the transport belt guiding the container is adapted servo-controlled and completely automatically to

the changed container format. The HEUFT *NaVi* user guidance system with audio-visual step-by-step assistance makes the fault-free operation of the highly automated HEUFT *InLine^{II} IS* in the gentle and efficient straight run practically self-explanatory.

With user-related access rights and a detailed audit trail log of all operating and process information the compact system fulfils the FDA's 21 CFR Part 11 requirements. This protects against unwanted parameter changes and makes all user activities permanently traceable. An online connection to higher-level databases and MES systems ensures real-time transmission, processing and complete archiving of detection images, batch and production data as well as reliable audit trail documentation. There is a network connection to the HEUFT *TeleService* for reliable remote diagnosis and maintenance.

Press release

Company profile: HEUFT is SYSTEMTECHNIK

Quality, safety, efficiency: this is what counts during the filling and packing of pharmaceuticals, drinks and foodstuffs! Modular checking and inspection systems from HEUFT SYSTEMTECHNIK GMBH realize these key factors effectively and simply. During maximum productivity they ensure that only faultless products reach the market.

Unique camera, X-ray and image processing technologies for the precise inspection of empty and full containers, trend-setting labelling technologies and smart tools for container flow optimization, production data acquisition and performance analysis ensure product quality and line efficiency sustainably!

A consistent modular principle with a cross-system control unit for a wide variety of technologies, processes, and modules generates the right automation solution for every application during high component uniformity.

Those who decide on a user-friendly HEUFT system can rely on a high level of operational reliability. Competent support is always guaranteed with spare parts available on a long-term basis and 24/7 service availability. This concept keeps the globally operating company on a dynamic growth course. In the meantime, the number of employees has long since exceeded the 1,000 mark. The company's own locations in 18 different countries and a close-knit network of service points on all five continents satisfy the high demand for HEUFT systems which are exclusively manufactured in Germany.

The result: more safety, quality and efficiency during the filling and packing of pharmaceuticals, food and drinks. HEUFT knows how!

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Fact sheet

Company:	HEUFT SYSTEMTECHNIK GMBH
Management:	Alexandra Heuft, Bastian Heuft, Bernhard Heuft, Dr. Thomas Jahn, Thomas Holzberger
Headquarters:	Burgbrohl, Rhineland-Palatinate, Germany
Other locations:	Argentina, Austria, Brazil, China, Denmark, France, Great Britain, Hong Kong, India, Italy, Mexico, Netherlands, Russia, Spain, Thailand, USA
Foundation:	01.04.1979
Employees:	over 1,000 in the HEUFT group
Sector:	special machine construction
Product range:	inspection, quality control, labelling, rejection, transport and IT systems for the pharmaceutical, food and beverage industries
Applications:	empty container inspection, container sorting, empty container inspection, filling management, full container inspection, foreign object detection, rejection systems, transport optimization, conveyor control, labelling technology, full container inspection, code reading, label inspection, closure inspection, production data acquisition, line analysis.
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