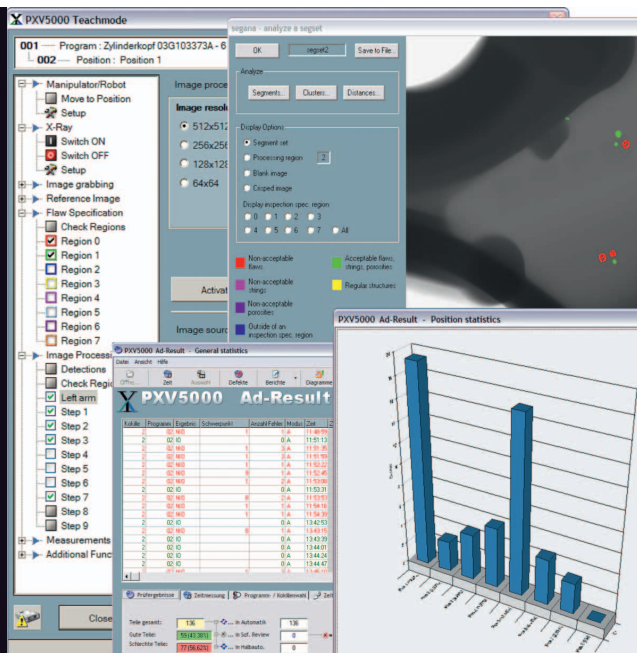


PXV5000 Release 3.8 – The measure to meet for ADR



YXLON is offering a significantly advanced version of its proven PXV5000 software for automatic inspection of cast parts: Release 3.8.

The new ADAMO filter enables flaw detection with minimal setup effort. All that has to be done here is to set the sensitivity via a slider. Oxides are reliably detected using the new YAMA filter.

What's more, PXV5000 operation has been considerably simplified by means of a tree-structured view.

Further enhancements include automatic creation of an inspection-item catalog as a PDF document, casting-flaw simulation, and automatic detector adaptation in case of replacement.

YXLON. The reason why.

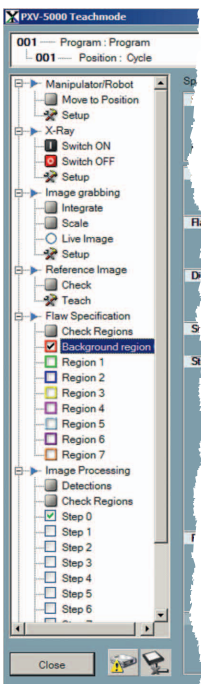
- Filter settings using just one sensitivity slider
- Precise volumetric depth measurement
- Deployment to external systems

PXV5000 Release 3.8

The PXV5000 system solution was developed for 100% X-ray inspection during 24/7 operation and has been on the market for more than 10 years. Depending on the X-ray source and detector used, in the course of automatic defect recognition the new Release 3.8 offers:

- a detectable flaw size of up to 0.5 mm²
- a false reject rate of approx. 2%
- a detectable minimal flaw depth measuring approx. 3% of the irradiated material depth

Optimized operation



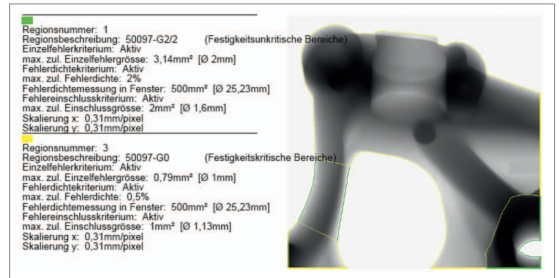
Analogous to Windows Explorer®, the PXV5000 has a tree-structured view. This enables convenient navigation through the steps required in an ADR program. Rapid switching back and forth between the image currently generated and images from a hard disk or network help in adapting filter settings by using known images of flaws. The analyses of findings can be implemented quickly and efficiently as a result. Flaws in different forms and sizes – both inclusions and missing material – can be placed as desired for simulation. In the case of regularly scheduled system tests, the functionality of all system parameters is validated by comparing them with reference parts called in automatically during normal inspection operation. A plausibility check warns against an undercoverage of inspection regions within the X-ray image.

Data security and backup

Thanks to an improved backup, besides inspection programs from a particular work system it is now also possible to save inspection programs from networked systems in a directory. And all at the single press of a button. The saved systems along with their inspection programs can be conveniently edited in one list. On the hardware level, data security is ensured through removable hard disks in a RAID array (e.g. mirroring of complete hard disks). If results data are supposed to be stored in a company network, an external "network-attached storage solution" (NAS) – equally configured as a RAID – serves as a buffer and can bridge interim downtime or a failure of the company network.

Automatic inspection catalog

In Release 3.8 it is possible to automatically create an inspection catalog in PDF format that contains the inspection specifications for each inspection position. In addition, the inspection position and its regions are integrated into the PDF as a screen shot as well.



Detector calibration

As with all software products from YXLON, PXV5000 also offers multigain correction alongside offset and gain correction. Multigain correction optimally corrects non-linear variances in the brightness of detector pixels. The result is a homogeneous detector image with a high signal-to-noise ratio.

Detector replacement support

In addition to the widespread RID512 model, current PerkinElmer XRD models are supported using G and N electronics. An automatically created transformation table assures that existing inspection programs can continue to be used following detector replacement.

16-bit imaging

Continuous enhancements of hardware performance allow imaging that has become faster and faster while remaining 16-bit throughout. The advantages are:

- a reproducible and more precise measurement signal due to a greater signal-to-noise ratio
- a lower cycle time, because more areas of varying material thickness can be analyzed and fewer inspection positions are necessary
- a further reduction of false rejects, because substantially more image information is available.

Training of regular structures

The recognition of detectable regular structures, boreholes for example, can be trained. With the help of geometric characteristics such as position, size or form, the software is able to identify these structures and evaluate them as regular. Since differences in brightness are taken into consideration too, defect recognition in cases where an overlay with a regular structure occurs is also ensured.



Improved filters

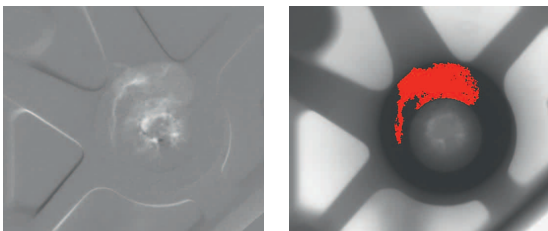
Although the PXV5000 system is already regarded as the "measure to meet" when it comes to minimizing false reject rates, the new Release 3.8 version offers significant improvements, among others with respect to application.

The proven TMF (trained median filter) has been re-optimized:

- An adjustable reduction of edges improves on what is already good behavior in edge areas.
- The learn algorithm has been accelerated.
- A self-test has been implemented.

The new CNF (circular needle filter) reveals flaws in rounded image structures quickly and dependably. Through the use of an ADAMO (adaptive morphology) filter, classic casting flaws are recognized with assurance using merely one single parameter setting: sensitivity.

The presence of oxides that arise in the course of certain casting techniques poses a special challenge for ADR systems. Only a few microns thick, oxides cause structural flaws in materials. As these flaws have a low density, they consequently lead to very low contrast in the image. The new YAMA filter specially developed for this purpose makes these flaws visible, yet does so while displaying insensitivity to component tolerances at the same time.



Deployment in a system array

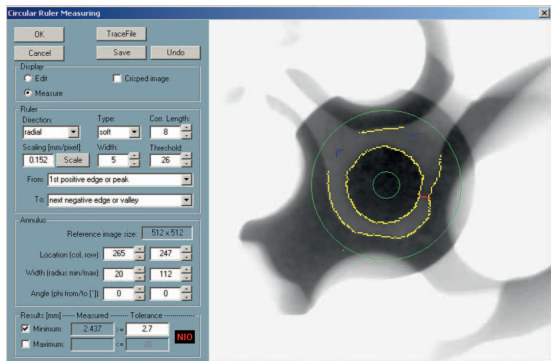
The Parameter Migration Assistant makes it possible to exchange inspection programs and settings between networked PXV5000 systems. This increases system availability, optimizes data security and enables rapid, uncomplicated software upgrades.

Offline stations

In addition to online inspection stations, one or more offline PCs can be integrated into the array. They make it possible to perform follow-up image verification, statistical analyses or the setup and maintenance of ADR inspection programs – including necessary readjustment work – and even parallel to ongoing operation.

Geometric measurement and evaluation

As one example, the automatic analysis of component structures serves in automatically inspecting wall thicknesses and spacings. This can be parameterized to a great extent.



Furthermore, the determination of filling levels and completeness control for complex assemblies are also possible.

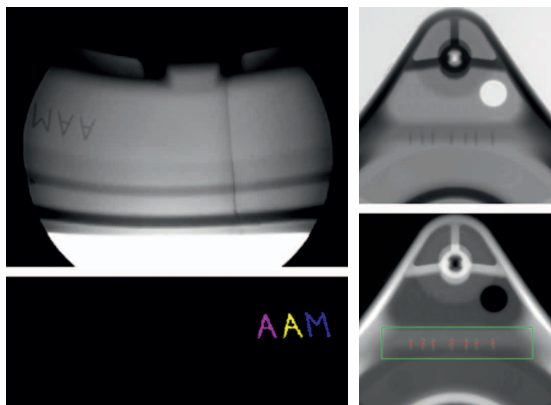
Volumetric depth measurement

In the case of volumetric depth measurement, a valuation according to maximum flaw depth and/or flaw volume takes place. A very high degree of precision is achieved through pixel-specific calibration of the gray values measured. Calibration does not occur using a step-wedge: it is done conveniently using a real-life component. As a result, the influence of scattering-radiation is taken into account, just as when measured later on, and minimized in sum total.

Part-type recognition

Part-type recognition can be carried out toward automatic selection of the correct inspection program, as well as to support statistical analysis. This is based on optical or radiographic image information, and takes place for example via:

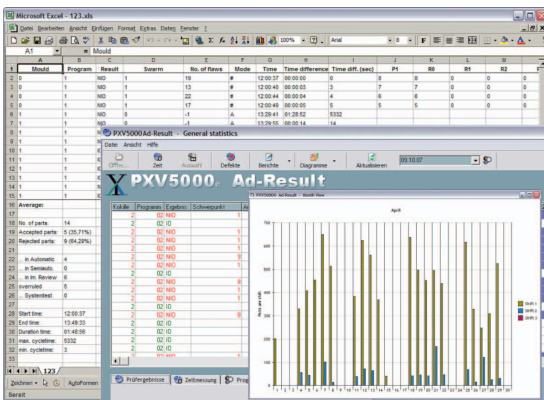
- OCR - optical character recognition for error statistics (visual or X-ray image)
- MCR - mould code recognition (bar or dot code) for error statistics (visual or X-ray image)
- PTR - part-type recognition (visual)



Statistical analyses

With the PXV5000 system, there are two possibilities for statistical analysis. The optional "AdResult" uses the inspection results and part-type recognition to supply reports as text, graphics, or in EXCEL®-compatible spreadsheets. The reports can be structured according to mould, position, work shift and time interval.

The "AdResult" option thus provides information about product quality and productivity, information which is already detailed. The second possibility offers support from the Q-DAS-ASCII transfer format. This deals with a standard interface for software solutions which ensure a transparent production process by means of an identification number system.



Access management

Strict access management enables access rights to be issued in 3 stages:

- Operator (starting and/or stopping the system)
- Service (unrestricted access to system components for purposes of servicing and maintenance, e.g. "inching" mode)
- Supervisor (full-scale access to system parameters, image-setting parameters, manual operating mode)

System environment

As a software for controlling manipulation, PXV currently supports industrial robots from ABB, Kuka, Reis, Fanuc and Bosch, as well as the Siemens SPS (S5, S7) and the PLCs from Allen Bradley and Bosch. Communication functions via the fieldbus systems Phoenix Interbus-S, Siemens Profibus, Siemens MPI and Industrial Ethernet.

Flaw specification

Classification using the following criteria is possible with the PXV5000 system:

- Single-flaw size
- Flaw density (clusters)
- Flaw spacing
- Flaw length (can also be differentiated acc. to direction of orientation)
- Single-flaw evaluation dependent on shape ("thread flaw")
- Single-flaw evaluation dependent on structure (porosities, loosening of the material fabric)
- Inclusions (inclusions with high densities, e.g. steel or copper)

Operating modes

The following modes of operation are possible:

- Manual operation: Individual system components such as manipulators, X-ray generation and the detector are operated manually during X-ray inspection
- Semi-automatic: Choice of predefined inspection programs by the operator, automatic workflow control and visual inspection take place via the inspection unit
- Monitored automatic: The ADR inspection decision is displayed, but the ultimate inspection decision is made by the operator
- Automatic inspection: Fully automatic inspection and decision are performed via ADR (PXV5000), direct control of inspection decisions during operation parallel to automatic X-raying
- Setup mode: Definition of inspection parameters such as position, X-ray settings and ADR parameters for individual parts inspection
- System configuration: System environment settings (e.g. choice of language, image depiction)
- Service & maintenance: Status display and testing of individual system components
- Log book: Saving of test results (statistics) and all activities involving the X-ray inspection system, backup and recovery functions for data, e.g. inspection program data and test results

Remote maintenance

A modem or internet hook-up to the system for purposes of servicing and advisory consulting is possible.