



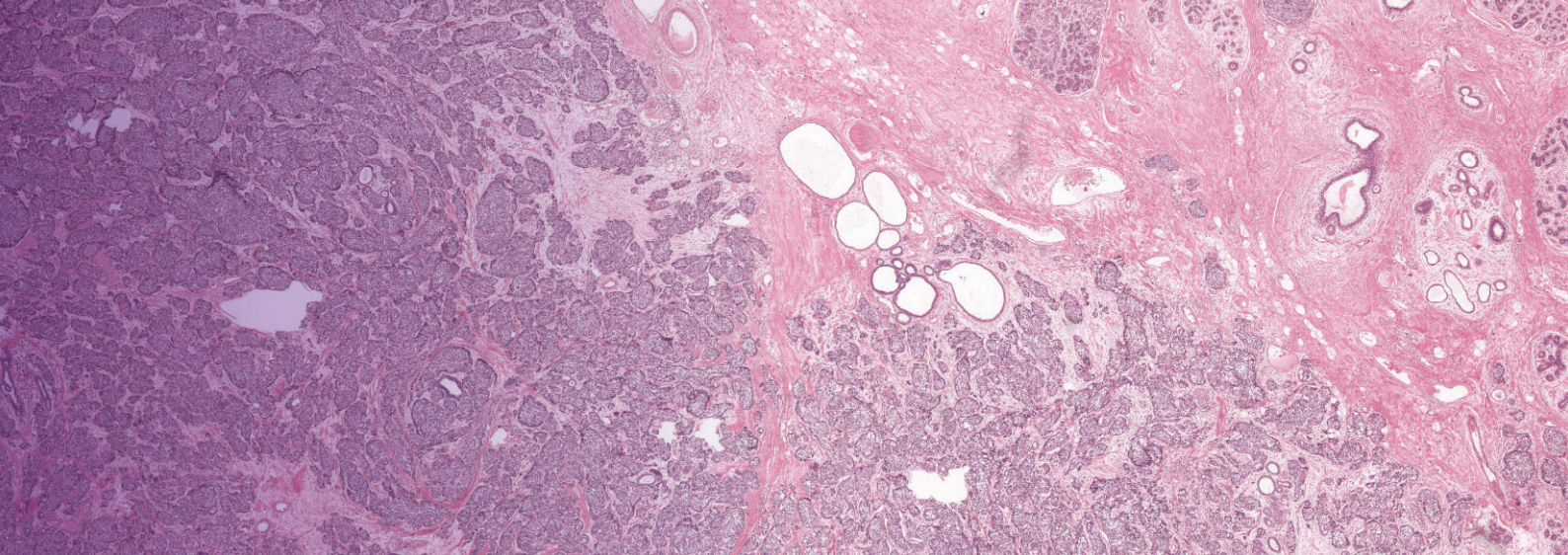
AiosynQC Product Brief

Automating quality control of whole slide images to increase the efficiency of clinical and research pathology workflows

AiosynQC* provides an AI-powered solution to identify the most common artifacts in the preparation and scanning of digital histology slides

Use case 1: Optimizing high-volume laboratory processing → p. 3

Use case 2: Improving algorithm development by excluding artifact regions → p. 7



Remove delays caused by artifacts in your digital pathology processes

Digital pathology has transformed diagnostic practices by replacing traditional glass slides with high-resolution whole slide images (WSIs), which are easily accessible. This innovation enhances the ability for remote inspections and facilitates sharing among colleagues. Additionally, it allows for integrating AI-powered solutions and improves the storage, retrieval, and tracking of digital slides for future reference.

However, a big challenge impacting digital workflow efficiency arises from quality artifacts. When transitioning from microscopes to scanners, not only do we encounter artifacts resulting from slide preparation, but we also find anomalies that appear due to scanning errors. These artifacts can compromise workflow efficiency by making parts of the slides unreadable, requiring rescans or the preparation of new slides. Additionally, low-quality images adversely affect the performance and development of AI-powered algorithms, which struggle to function effectively in the presence of artifacts.

The importance of early detection and reparation of the affected digital slides is undeniable, as high-quality images are crucial for accurate clinical diagnoses and research. Delays in identifying these artifacts can lead to considerable inefficiencies, with pathologists having to re-examine previously analyzed slides or prepare new ones. Manual visual inspections are often laborious and may not effectively identify subtle artifacts at low magnifications. However, quality control (QC) with deep learning algorithms can automate the labor-intensive manual process, reducing delays caused by low-quality slides and time-consuming manual reviews.

AiosynQC seamlessly integrates into your existing workflow and can be tailored to meet your sensitivity and reporting requirements, bringing these advantages without needing significant investment, additional platforms, or extended processing times.

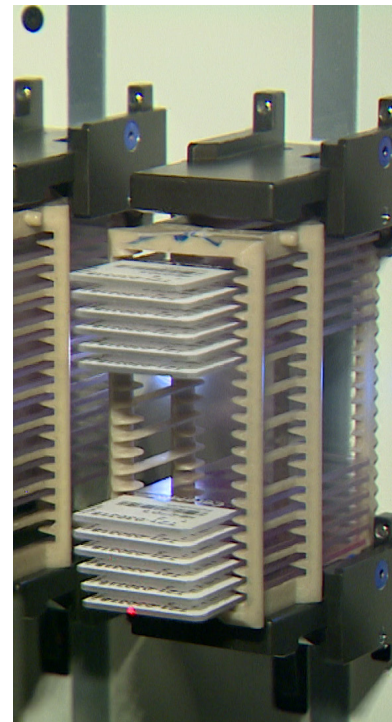
* AiosynQC is not a medical device under the EU IVDR and the UK MDR 2002. It is not intended to be used as an accessory to, nor is it necessary to be used in combination with, any AI or other medical devices to specifically enable them to meet their intended purpose or directly assist in their functionality. In the US, AiosynQC is for research use only.

Streamline your digital pathology workflow with AiosynQC

AiosynQC is a modular AI-powered solution designed to automate the quality control of digital histology slides. The algorithm effectively detects and highlights common artifacts in hematoxylin and eosin (H&E) and immunohistochemistry (IHC) slides. It embeds into existing platforms, facilitating easy implementation in your laboratory settings. AiosynQC can display results in various formats, such as worklists of accepted and rejected slides, detailed quality scores, and color-coded indicators that reflect the presence or absence of artifacts.

To ensure high robustness and generalizability, our advanced algorithm was developed and validated using datasets with over 35,000 manual annotations of quality artifacts and hundreds of WSIs from more than 20 different medical centers, utilizing slides from various organs and retrieved from multiple scanners.

AiosynQC can support your pathology lab with the timely identification of artifacts in digital slides, which is crucial to ensure the efficiency and effectiveness of the diagnostic and research processes.



Use case

1

Optimizing high-volume laboratory processing

Context: In a fast-paced clinical laboratory handling around 1,000 digital histology slides daily, maintaining quality standards is critical. Each whole slide image must undergo a preliminary review to identify and document any artifacts before proceeding to pathology analysis. This ensures that only high-quality slides are analyzed, maintaining the integrity and accuracy of diagnostic results.

Comparison of traditional manual QC vs AiosynQC:



Traditional Manual review

- Technicians do a quick check of ~30 seconds per slide.
- This results in 8 hours spent by lab technicians on quality checks each day, depending on the complexity of the slides and the proficiency of the technician.
- Manual reviews are susceptible to variability in standards and potential human error.



AiosynQC Automated review

- AiosynQC can automatically analyze batches of 50 slides in just 1.5 to 5 minutes total.
- Daily processing time is just 0.5 to 1.7 hours.
- Improved objectivity and reproducibility in QC

Accepted: 950

Rejected - need rescan: 30 [View artifacts](#)

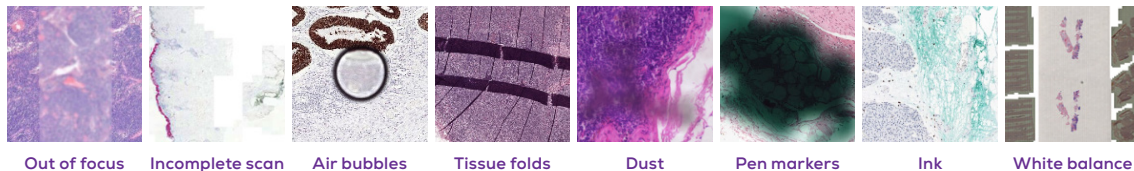
Rejected - new preparation: 20 [View artifacts](#)

Benefits: AiosynQC substantially reduces the labor-intensive manual review time and ensures consistent quality checks across all slides.

AiosynQC in action

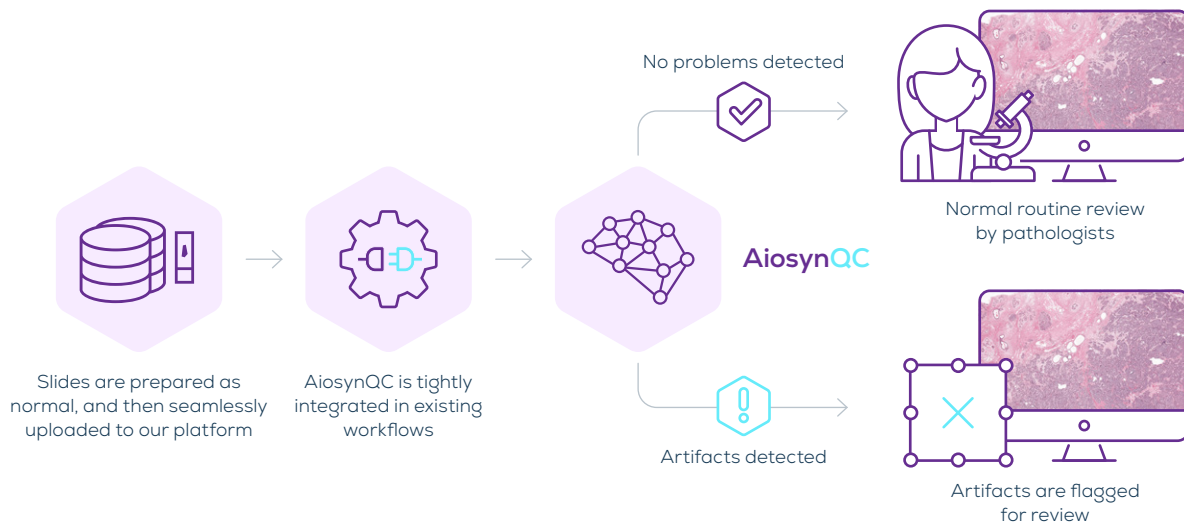
Artifact detection

AiosynQC identifies and segments common artifacts encountered in H&E and IHC slides. These artifact types include out of focus regions, incomplete scan, air bubbles, tissue folds, dust, pen markers, and ink.



Step-by-step

Laboratory technicians prepare slides using standard procedures. Once uploaded to the platform, our algorithm automatically initiates the analysis, scanning each image for artifacts without the need for manual intervention.



Software compatibility and flexibility

AiosynQC is designed with versatility in mind, seamlessly adapting to a wide range of digital pathology workflows. This flexibility facilitates the software's integration into virtually any existing laboratory setup, improving efficiency without disrupting established processes.

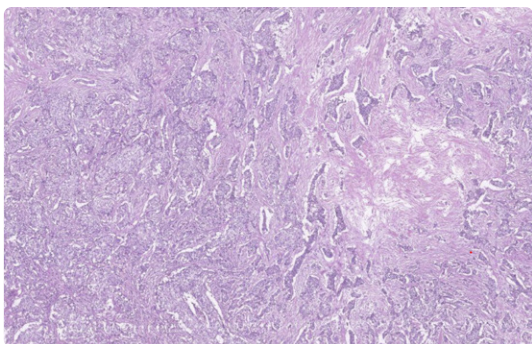
Vendor-agnostic integration	The algorithm can be integrated with most common viewers and Image Management Systems.
Deployment	As a service hosted in a secure cloud platform, containerized app, or installed on-premises.
File formats	Compatible with the OpenSlide standard; supports various formats such as TIFF, SVS, MRXS, and more.
Stains supported	Hematoxylin and eosin (H&E) and immunohistochemistry (IHC) stains. Additional stains are on the roadmap.
Customizable approach	Tailored sensitivity and customizable reporting options to adapt to the specific needs of each laboratory.

Tailored sensitivity

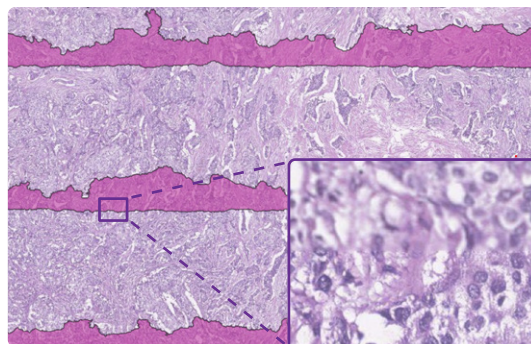
AiosynQC offers advanced customization options for outputting specific artifact regions of interest from analyzed slides. Users can tailor the selection criteria based on several parameters, including:

- **Region Area:** Specify the minimum size (pixels or percentage of affected area) of artifact regions that should be segmented, allowing for a focused analysis of significant areas or a more thorough analysis of all artifacts.
- **Artifact Intensity:** Set thresholds for the intensity of detected artifacts, such as degree of out-of-focus, to filter out elements based on their relevance and impact.
- **Artifact Type:** Choose to view or ignore selected artifact types, such as air bubbles, tissue folds, or ink marks, enabling more targeted and relevant analyses and reducing processing times by excluding artifacts that do not pose problems to your laboratory.

These customizable features allow you to optimize the algorithm's output and processing times according to your specific requirements, thereby boosting the efficiency of pathology evaluations.



Low sensitivity by artifact intensity: Whole slide images with subtle out-of-focus areas are not flagged and pass the quality control check.



High sensitivity by artifact intensity: Whole slide images with subtle out-of-focus areas (highlighted) are flagged for rescanning.

Customizable reporting

AiosynQC can display results in various formats, such as worklists of accepted and rejected slides, detailed quality scores, and color-coded indicators that reflect the presence or absence of artifacts. For a deeper analysis, one can directly click on a whole slide image to access an overlay segmenting the affected regions and types of artifacts.

Additionally, our digital slide quality assessment services provide comprehensive, data-driven evaluation reports, empowering your laboratory with the insights needed to continuously improve your digital pathology workflows.

The screenshot displays the AiosynQC interface. On the left, a sidebar menu shows 'System Worklists', 'Role Worklists', and 'User Worklists'. Under 'User Worklists', 'John Smith' is selected, and a 'Worklist' dropdown menu is open, showing 'Accepted', 'Rejected - new preparation', and 'Rejected - rescan'. The main area shows a table of rejected slides for new preparation. The table has columns for ID, Date and time, Modality, Body part, Description, and Accession number. Below the table, there is a 'Patient History' section showing '1 examination, 1 matching'. A table below this shows a single entry with a play button icon, date '09/03/2023, 13:18', modality 'SM', and accession number '0cc53e8e4c5...'. At the bottom, there is a section titled 'Images in 0cc53e8e4c52440db06c5118e294606e' showing a thumbnail of a slide image. A callout box points to the thumbnail, stating: 'Whole slide image of the slide selected above, including an optional layer displaying the algorithm's output'.

ID	Date and time	Modality	Body part	Description	Accession number
0cc53e8e4c52440db06c5118e294606e	09/03/2023, 13:18	SM			
11168_4d9cc6e0-62dd-4d11-802a-F	15/11/2023, 10:29	SM			
11999_9fee8f8d-8fdc-490d-866f-9	15/11/2023, 10:57	SM			
4c165f3f69ff4acb989ef7fcea290826	09/03/2023, 13:17	SM			

Worklist

Accepted

Rejected - new preparation

Rejected - rescan

History

Search Results

Patient History 1 examination, 1 matching

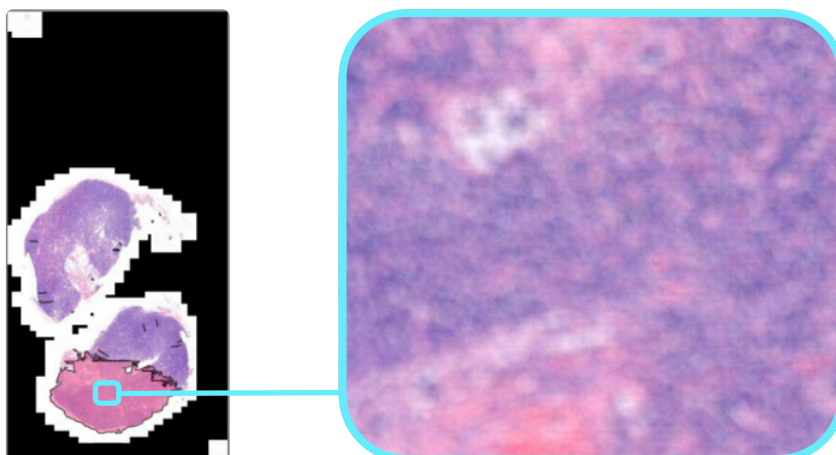
Prog...	Date and time	Modality	Body part	Description	Accession number
	09/03/2023, 13:18	SM			0cc53e8e4c5...

Images in 0cc53e8e4c52440db06c5118e294606e

Whole slide image of the slide selected above, including an optional layer displaying the algorithm's output

Area segmentation

Our AI-powered solution not only classifies slide images based on the presence or absence of artifacts but also segments and labels the affected areas by artifact type. Additionally, it quantifies the percentage of tissue impacted by these abnormalities, providing a detailed overview of the slide condition.



Improving algorithm development by excluding artifact regions

Context: In the field of digital pathology, the development of robust AI algorithms is crucial for accurate diagnostics and research. However, the presence of artifacts in pathology slides can significantly skew the algorithm's learning process, leading to less reliable outputs. To combat this, AI providers must meticulously identify and exclude these artifact regions to secure the integrity of the data used for training their models.

Comparison of traditional manual QC vs AiosynQC:



Traditional Manual review

- Each slide requires 1 to 5 minutes for manual review.
- This results in 2 to 8 hours spent on quality checks for projects involving ~100 WSIs.
- Manual reviews are susceptible to variability in standards and potential human error.



AiosynQC Automated review

- AiosynQC can automatically analyze batches of 50 slides in just 1.5 to 5 minutes total.
- Processing time is just 3 to 10 minutes for projects with ~100 WSIs.
- Improved objectivity and reproducibility in QC
- The solution pinpoints specific coordinates of regions impacted by artifacts, enabling precise exclusion from the training data

Benefits: AiosynQC substantially reduces the labor-intensive manual review time and helps labs ensure that only high-quality, artifact-free data is used during the training and development phases of pathology AI solutions. This not only enhances the reliability and performance of AI applications but also optimizes data usage. For example, slides partially out of focus or with some tissue folds can still contribute valuable data if unaffected areas are isolated and utilized.

Experience the gains



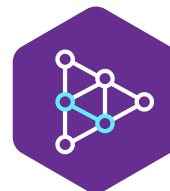
Improve the quality of your slide review process

- More reproducible, objective QC
- Continuous workflow monitoring and improvement
- Minimized risk of compromised images in diagnostics or research
- Enhanced outcomes through improved data quality



Time savings in your pathology workflow

- Reduced time on manual quality control
- Decreased waiting time for rescanned images

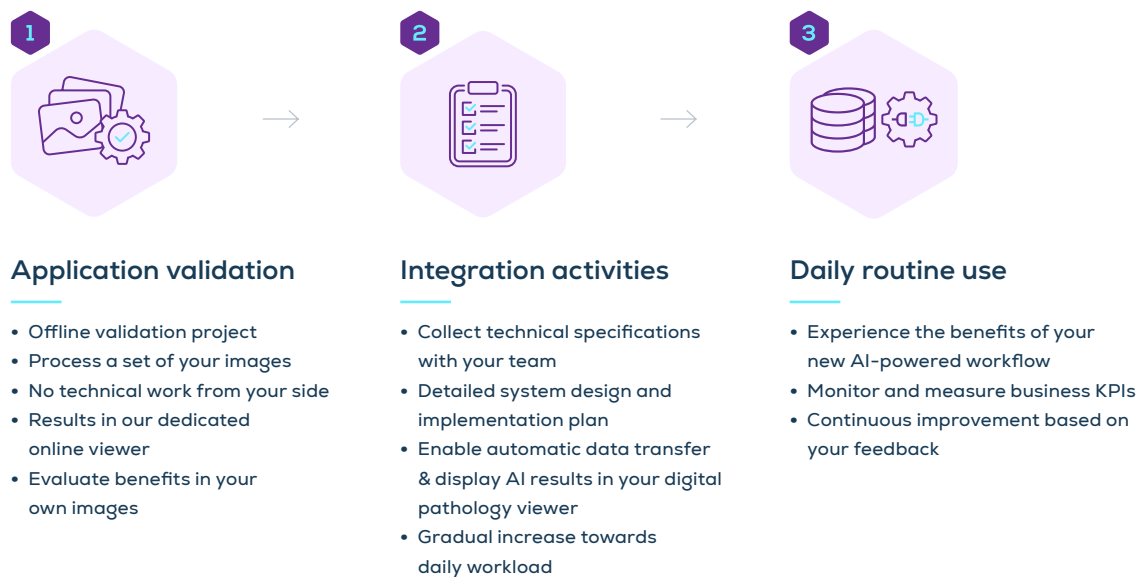


High-quality images for AI training and analysis

- Artifact-free images for development of AI solutions
- Improved data quality for subsequent AI analysis
- Minimized algorithm underperformance due to artifacts

AiosynQC not only offers benefits to technicians performing the assessments, but it positively affects the entirety of the workflow. Providing pathologists with high-quality images increases their confidence and eliminates the need to allocate resources to revisiting problematic slides, thereby minimizing workflow disruptions. This, in turn, ensures higher efficiency, optimized turnaround times, and cheaper costs for assessments, benefiting the organization as a whole, both in research and clinical settings.

Integration process: From validation to routine operation



Pilot opportunities – Test AiosynQC on your whole slide images

By engaging in a pilot, you can see firsthand how AiosynQC enhances your digital slide quality control through efficient artifact detection.

Evaluate performance on your data:

Directly observe our solution's effectiveness and detection capabilities using your collection of WSIs.

Risk-free evaluation:

This pilot offers a no-obligation opportunity to evaluate the strengths and benefits of AiosynQC without a long-term commitment. Discover how our technology can streamline your processes and improve data quality with minimal risk.

Feedback-Driven Development:

Your insights and feedback during the pilot will help us to fine-tune our solution to meet the specific needs of your laboratory environment and use cases.

Contact us at contact@aiosyn.com to learn more about this opportunity and to schedule your pilot.