QUARTZ FA-LIMS
Laboratory Information Management System for Failure Analysis
FROM JOB REQUEST TO FINAL REPORT, THE COMPLETE, CUSTOMIZED ANALYTICAL LABORATORY WORKFLOW SOLUTION

| Save Time | Improve Lab Efficiency | Easy, Secure Access to Data |

INTRODUCTION

The less time you need to spend on administrative tasks, the more time you’ll have for solving production problems. The Quartz LIMS product line provides tools to automate all facets of laboratory workflow from job submission to report preparation. Quartz offers web-based and Windows®-based tools for job submission, data acquisition, data analysis and review, data storage and retrieval, and automatic report preparation — as well as the management tools you need to make it all run smoothly.
**BUILDING BLOCKS for FA-LIMS**

Quartz Imaging has more than 2 decades of experience developing data acquisition and management applications for analytical laboratories. By drawing upon this experience and, where appropriate, using our pre-built components, we can custom tailor a high quality LIMS solution to meet your needs rapidly and cost-effectively.

The foundation of our AL-LIMS & FA-LIMS solutions is our Windows-based Quartz PCI Lab & PCI Office software. With thousands of installations, it is time-tested, stable and well proven. PCI handles the data acquisition, annotation, measurement and reporting in a single application to ensure smooth workflow and correct association of database information with analytical data.

Users outside the laboratory interact with the system through their web browser in order to enter job requests, retrieve results and search for data. Because it is web-based, users do not need to install special software on their workstations.

The web application is also used to manage the laboratory work queue and to produce laboratory performance reports.

The web application can connect to your organization’s existing e-mail system to send status reminders and notices to the appropriate people automatically as requests progress through the workflow. We can also devise methods to connect to existing company databases to retrieve human resources information, lot/sample data and other information.

Data is stored in our Enterprise Database using Microsoft SQL Server. Various security models can be employed to ensure that data can be viewed or modified by only the appropriate people.

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### QUARTZ PCI Lab & PCI Office

- Data Acquisition
- Report Creation
- Measurement
- Instrument Control
- Image Processing
- Remote Access

### QUARTZ Intranet Image Server & Analytical Lab Manager

- Request Submission
- Data Searching
- Laboratory Management
- Performance Reporting
- User Management
- Status Monitoring

### QUARTZ Enterprise Database

- Data Storage
- Full Text Indexing
- Security
THE “IMAGE SMART” LIMS
Data Acquisition
Quartz Imaging has extensive experience with acquiring image, spectrum and other data from numerous laboratory devices. We will work with you to interface to your particular tool set. The Quartz PCI Office provides a common user interface for all tools, so your laboratory personnel won’t have to learn new software for each instrument.

Image Processing
The Quartz PCI Office includes numerous image processing functions, including contrast, brightness and gamma adjustment, color correction, histogram adjustments, zooming, smoothing, sharpening, median filtering, rotating and resizing. Our consultants can work with you to develop special functions for your application.

Database Entry
By combining data acquisition and the entry of the associated database information in a single application, Quartz PCI helps to ensure that the correct database information is associated with the data you collect. Users of the client can easily retrieve job information and enter additional information as their work progresses.

Report Creation
The Quartz PCI Office includes a full-featured report layout editor. Reports can be exported in the Microsoft Word and PowerPoint formats, as well as in HTML and Adobe PDF formats. You can design your own report templates, or leave this to our design department who can design custom templates to meet your needs.

Image Annotation
Quartz PCI’s image annotation tools, including text and various other graphics, operate on a separate overlay layer. This means that annotations can be moved or deleted without interfering with each other or the underlying image. It also ensures that annotations are printed at the maximum possible quality.

Remote Control
Quartz Imaging has done extensive work in the area of instrument remote control. Remote control allows you to interact with distant lab facilities and to provide assistance to less experienced instrument operators without having to visit the lab.

Measurement
The Quartz PCI Office includes an extensive set of tools for measuring features in your images. Measurement results are displayed in a spreadsheet grid that makes reviewing the data or transferring it to Microsoft Excel, or other analysis programs, easy.
QUARTZ INTRANET IMAGE SERVER & ANALYTICAL LAB MANAGER

01. Request Submission
Submitting job requests is the first point of contact with the system for your lab’s clients. Our consultants will work with you to develop the appropriate data entry forms for each type of request and sample that your facility, or facilities, handle. If you require, we can implement approval mechanisms so that, for example, the requestor’s manager can approve the request. Throughout the process, automatic e-mail notifications can be used at various points in the workflow to track the progress of the request.

02. Laboratory Management
The lab manager component allows lab personnel to review tasks, edit them as required, assign priorities and assign tasks to the job. The lab manager can track the progress of requests through the lab and review and release reports. Again, e-mail is used to notify the requestor when the results are ready.

03. User Management
Functions are provided for managing the systems users and assigning roles and access rights to users. For installations, where server accounts and laboratory user lists are managed by one person, we can integrate the server and laboratory account management in a single web page.

04. Data Searching
The system permits searching for data relating to a specific job, searching using database fields, keywords and searching via full text search of the database and contained documents.

05. Performance Reporting
Because the time of each state transition is recorded as requests pass through the workflow, it is possible to generate detailed laboratory performance reports. Our software includes a number of standard reports and we can work with you to generate specific, custom reports to meet your requirements. Because the Enterprise Database is built on Microsoft SQL Server, you can also generate reports with Microsoft Access and numerous third-party reporting tools.

06. Collaboration
Collaboration allows your clients, via a network connection, to “look over the shoulder” of your analysts and see live video of the work in progress. This helps ensure, for example, that the analyst is actually looking at the correct area of the sample. This reduces having to repeat work in the lab by ensuring that the requestor is delivered the results he or she wants in the first place.
We utilize Microsoft SQL Server as the underlying database engine for our system. In our experience, it has proven reliable and relatively easy to maintain. Our advisors can assist your IT personnel to install this system and provide advice as to its maintenance and back-up requirements.

Full Text Indexing

Full text indexing of both the database and individual documents allows you to do "internet search engine" style searches through your data. For example, doing a search for "green precipitate" will scan the entire database and your collection of documents for these words and return a set of results, including images, other data and reports, helping you find previous occurrences of this problem.

Security

Quartz Imaging has developed a security model for SQL Server whereby individual records can be secured much like individual files in the file system. This way, you can ensure that database records can be viewed or changed only by those with permission. For example, security can be established such that each client of your lab can only see results pertaining to his or her own requests, while lab personnel, if desired, can see all results.

Data Storage

4. Data can be retrieved by job, through full text search or by searching for specific database parameters.

5. As requests pass through the workflow, times of all of the state transitions are recorded allowing comprehensive management reports to be generated.

6. Collaboration microscopy allows your clients to observe as their requests are worked on, allowing them to guide analysts to the points of interest.

QUARTZ ENTERPRISE DATABASE

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QUARTZ Intranet Image Server & Analytical Lab Manager is iPad Compatible.
OTHER EXPERTISE

IT Consultation
To be successful, your custom application must be deployed on a stable hardware and software platform. You must also have sound back-up and disaster recovery plans. We can, either independently or in consultation with your IT department, help you to plan and implement these systems.

Hardware Design & Development
Quartz Imaging has extensive experience in the development and construction of specialized hardware for data acquisition, pulse processing and instrument remote control. If your application calls for specialized hardware, we are well prepared to undertake this development.

Automated Inspection Systems
For applications that call for repeated measurement and pattern recognition tasks, we can develop systems for you to automate the process. We can automate instrument stage movements and perform automated data acquisition, pattern matching and measurements, with the results stored in our Enterprise Database.

Special Metrology Functions
Your application may require specialized image processing and metrology functions. We can develop custom software for you in order to automate these tasks.

Regulated Industries
If your industry operates in a regulated environment, we can develop systems to help you comply. For example, we have developed software for image storage in the pharmaceutical industry to aid in compliance with the FDA’s 21 CFR Part 11 regulations.

CONCLUSION
Quartz Imaging’s experience, knowledge of industry best-practices and comprehensive library of proven, high-quality software components can help you to ensure the success and smooth operation of your laboratory information management system implementation.
We look forward to discussing your requirements with you.
SUMMARY OF FA-LIMS CAPABILITIES

Professional Services
- Configure FA-LIMS to your specific workflow and data needs
- Microsoft SQL Server
- database development
- Integration with existing PCI Database
- IT consulting
- Custom hardware development
- Specialized inspection and measurement applications

Enterprise Database
- Client/Server system suitable for enterprise-wide image management.
- Based on Microsoft® SQL Server.
- Same client interface as PCI Workgroup Database.
- Database tracks jobs, tasks, sessions, samples, images and external documents including multimedia files.
- Provides web-based job submission, job search and data search functions via Intranet or Internet.
- Platform independent. Compatible with standard browsers.
- Dynamically resizes and reformats images on server side in response to users’ requests.
- Uses Microsoft® Internet Information Server.

Analytical Lab Manager
- Allows manager to review job queue and adjust priorities.
- Allows manager to create tasks and assign to technicians.
- Automatically sends e-mail to requestor and lab personnel on status changes.
- Produces lab productivity and status reports.
- Easily configured to mesh with your organization’s methods.

Quartz Collaboration Microscopy
- Collaborate with lab personnel from any location via intranet/internet connection.
- Video inputs for up to four NTSC/PAL video sources per instrument workstation.
- Live video resolution of 320 x 240 x 24 bits at up to 30 frames per second or 640 x 480 x 24 bits at up to 10 frames per second.
- Supports H.263, M-JPEG, JPEG.
- Saved images and microscope operating parameters are automatically transferred as soon as they are stored by the operator.
- Permits multiple clients to connect simultaneously.
- Optional Talon Remote Control permits remote operation of Hitachi microscopes with complete replication of instrument GUI.

PCI Lab and PCI Office
- Runs on Windows XP®, Windows® Vista or Windows® 7.
- Common user interface for all sources.
- Images can be stored in most popular file formats.
- PDF, DOC and PPT report file export.
- Most popular file formats can be imported.
- X-ray spectra viewing in the Quartz XOne and EMSA formats.
- Image manipulation functions include contrast, brightness and gamma adjustment, color correction,
- histogram adjustments, zooming, smoothing, sharpening, median filtering, rotating and resizing.
- Support for 24-bit color and 8- and 16-bit gray scale images.
- Length, angle and area measurements.
- Drawing tools operate on separate overlay layer. Overlay elements can be moved or deleted without interfering with each other or the underlying image.
- Slide show function.
- Construction of anaglyph stereo image.

Quartz Gatekeeper
- Web-based instrument booking calendar
- Instrument access control system
- Optional RFID card access control
- Instrument usage record
- Keeps and reporting
- Reduces instrument damage

Annual Enterprise Service and Assurance Program (ESAP)

The Enterprise Service and Assurance Program ensures that you will always be compatible with future service packs, operating systems and instrument software versions. All minor and major releases of your Quartz PCI products will be provided to you at no cost.

You will also have access to our Help Desk and receive assistance with computer upgrades, new operating systems, instrument software upgrades, bug fixes and Quartz will remote access into your system to assist you with the installation of updates, upgrades and any custom development.
QUARTZ FAMILY of PRODUCTS

FA-LIMS
Laboratory Information Management System

- The only LIMS system designed specifically for Failure Analysis and Materials Characterization labs
- Highly configurable to your specific workflow and needs
- Laboratory performance reporting

AL-LIMS
Laboratory Information Management System

- Web-based job request submission
- Easy, secure data retrieval
- The ‘Image Smart’ LIMS system
- For small labs

PCI-AM
Automated Measurement

This new module for Quartz PCI provides automated measurement features for engineers who measure different types of semiconductor device features on a single image or a batch of similar images.

Automatic feature measurement:
- Saves time
- Increased accuracy
- Consistent results
- Easy access to data

PCI-CFR
PCI CFR

Helps You Comply with 21 CFR Part 11
- An audit trail is maintained of all operations carried out on images by the user
- All versions of image files are retained by the system. If the user saves a new version of an image, it is assigned a version number in sequence and does not overwrite the original data
- Data files are encrypted to discourage tampering and are protected using a "digest" to detect tampering
- Digitally signed PDF files may be exported

All versions of each image are retained by the system. It is always possible to retrieve earlier versions.
QUARTZ FAMILY of PRODUCTS

 PCI Office

Imaging Software - used for offline (away from instrument) viewing, processing and analysis of images acquired with Quartz PCI Lab.

Also reads images from most EM manufacturers already calibrated – Hitachi, FEI, Zeiss and others.

 PCI Lab

Laboratory Imaging Software – Suitable for most image producing instruments including:

- SEM, TEM, STEM
- Tabletop SEM
- PC based instruments
- Cameras
- 3rd party EDX systems
- Scanners

 Gatekeeper

- Web instrument booking system
- Instrument access control
- RFID system (option)
- Increase instrument use
- Decrease instrument damage

 FAB Automation

- Remote control from outside of Fab
- Remote data collection
- Rapid ROI

 Custom Development

- Software & hardware solutions
- Laboratory solutions
- Automated inspection
- Metrology & image processing

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