Introducing RadMachine

The Comprehensive QA Platform

The webinar was hosted by Radformation founder Tyler Blackwell, MS DABR. The presentation, RadMachine: Automated Machine QA, was given by RadMachine Product Manager James Kerns, PhD DABR.

A live poll reveals that 70 percent of webinar viewers currently use spreadsheets, and 54 percent use vendor-specific software, for machine QA. We use a mix of King’s old spreadsheets, K&S’s spreadsheets, SunCheck Machine, and DailyQA3. Most clinics use several different tools for machine QA. This leads to fragility as the tools do not integrate well with each other.

RadMachine is cloud-based software, meaning you don’t have to install anything; you just access RadMachine in the browser.

One of RadMachine’s claims to fame is its deep customization. For example:

* There are many test types:
  + True/false
  + Date
  + Multiple choice
  + Equipment lookup
  + QA lookup
  + File upload
  + Calculations
  + Script

Some of these test types aren’t exactly *tests*, per sé, but they allow integration of various tools into RadMachine. For instance, equipment lookup allows you to use a specific ion chamber for TG-51.

* There are over 200 different possible combinations of permissions.
* You provide your own review statuses.

Radmachine includes ancillary equipment testing/tracking. You can track calibration information and statistics and connect specific ancillary devices to QA tasks. Sounds like a great alternative to our “Instrumentation” spreadsheet that we forgot to check and thus missed some calibration due dates.

RadMachine includes image analysis.

You can trend and report on anything, for any time range. This is in contrast to SunCheck’s limited plotting options.

Download a chart as a PNG, export data to CSV, and generate links to charts.

You can set up email notifications for tasks that are upcoming or overdue.

You can track faults and service evnts, including scheduling PMs. Track who touched what and when. Track vendor reports. Calculate downtime and uptime (e.g., to compare to vendor’s guarantee). Associate QA runs as return-to-service QA.

Data can be automatically loaded into RadMachine using a local tool. This tool currently works with Performance Check, DQA3, Aria Imaging, and local files. RadMachine is meant to handle multiple data streams, from linacs to sim devices to ancillary devices.

The phantom jig works works with around 10 commercial phantoms.

Users may be managed with SSO/Active Directory, which obviously requires IS’s blessing.

The main dashboard is organized by site. You can customize to limit which machine each user sees (e.g., only show the therapists the machines they’re working on today).

The list of QA tasks is sortable and searchable.

The list of QA tasks includes a “History” column, which includes a direct link to charting. Ther’s also a “Skip” column that allows the task to ignore certain subtasks. You can provide contact info below the list of QA tasks.

Unlike in SunCheck, RadMachine QA task descriptions/instructions can include uploaded files, such as Word documents and images.

Like everything else in radMachine, the pass/fail criteria are inifinitely customizable. You can set one-sided tolerances, or not provide tolerances at all.

You can set review status in bulk. You can also set up autoreview (e.g., if everything passes in the daily QA, automatically set review status to “Reviewed”).

Reports can use your own logo instead of Radformation’s.

PDF reports link to RadMachine.

Save report settings to generate future reports. Schedule reports.

Fault log

Below the fault, see a list of other occurrences of the same fault.

Service events log

Send service event reports to FSE.

Service events functionality includes parts management inventory.

Add reference data for ancillary equipment.

Calculated fields are defined using Python.

Provide multiple values and use a summary statistic, such as min, max, or mean.

An lookup test uses a value from some other area, like an ancillary device or another QA test. Example: Compute % output difference from your last TG-51.

Use Python to extract data from other sources, such as Excel spreadsheets.

RadMachine image analysis includes preprocessing. Preprocessing settings can be saved as templates and automatically applied for other analyses. Semsible default input parameters are provided, but you can of course fine tune these.

The main speed bottleneck in file/image upload to RadMachine is your own network. The image analysis itself is very fast.

ThAny test result can be shown in JSON format. This is useful for scripting.

RadMachine does what ScanDoseMatch does, but much more usably. Compare profiles, optionally specifying a refernce profile.

# Audience Q&A

They didn’t have even close to enough time to address all the questions, including mine soliciting experience using RadMachine for patient-specific IMRT QA.

**Q:** Is RadMachine Internet based or installed on an internal server?Int-based on internal server?

**A:** Cloud based using the Google Cloud Platform (GCP), so it is accessible anywhere.

**Q:** Can Radmachine interact with MOSAIQ assessments for daily QA?

**A:** No. Radformation primarily orients toward Varian, and the product manager doesn’t have any experience with MOSAIQ, but Radformation will consider adding MOSAIQ support in the future.

You can, of course, upload MOSAIQ images to RadMachine.

**Q:** RadMachine’s customizability is phenomenal, but what comes preconfigured?

**A:** There’s lots of example data. At onboarding, Radformation support will work with you to select any applicable templates, such as MPPG-8 or TG-51. Support will also train you step by step on how to set up your own QA tasks.

**Q:** How long does it take to create a QA task?

**A:** The 80/20 rule: RadMachine has done 80 percent of the work; the remaining 20 percent is customization for your clinic. Creating a test or test list doesn’t take long, and you’ll learn with practice. The RadMachine user documentation is also very comprehesive and includes a “Getting Started” guide with little “homework” tasks.

**Q:** Can we get automatic warnings for ancillary device calibrations that are past due?

**A:** RadMachine is just a platform; you can set up any “unit” that you want, from machine to ancillary device to TPS. A “unit” is just something that you attach QA to. So, yes, you ca get calibration notifications by setting up a frequency for the “test” (calibration) attached to the ancillary device (unit).

**Q:** Can RadMachine access specific DQA3 values?

**A:** Well, you can always manually enter the data or upload a file. But the local agent that comes with RadMachine, queries the DQA device and extracts data from files. If Radformation does not currently support your file format, send it to them.

**Q:** How does the local agent work? Is it a Windows service?

**A:** The local agent is an independent, standalone executable. It simply points to the DQA database and periodically queries it for new files. It periodically queries the database at the user-sepcified frequency. It is read only.

**Q:** Is the API in C#?

**A:** An API, by definition, is just a way to get data from a service – in this case, RadMachine. It is lannguage agnostic. The RadMachine API supports HTTP/HTTPS GET and POST request for literally anything you can do in the GUI. So yes, if you want to use C#, you can.

POST requests could definitely eliminate some of the tedium of uploading ancillary device calibration factors, etc.

I’m pretty sure SunCheck has an API, too.

Don’t confuse the API with script fields or custom information extraction from uploaded files. This is done in Python. Anything Python can do generally, it can do in RadMachine.

**Q:** Does RadMachine work with Halcyon? Elekta Infinity?

**A:** RadMachine is vendor agnostic; add any unit you want.

There is no Halcyon MPC data, but that is in the works.

**Q:** Does RadMachine bring in individual CBCT slices, or does it bring in the whole scan and automatically locate the slices you need to analyze?

**A:** The local agent automatically detects multi-file image files and zips the files befor uploading to RadMachine.

The slice location is located automatically using bootstrapping, so no reference/baselining is necessary. RadMachine even automatically corrects obvious anomalies like twist and roll. This automatic correction is one feature that differentiates RadMachine from competitors.

The image analysis is almost completely open source using pymedphys.

**Q:** Can I use RadMachine for MPPG or TG tests? Can Radformation provide templates for these?

**A:** Yep, they provide bear-bones templates, and they will tweak them with you during training.

**Q:** How is user management handled? Active Directory integration?

**A:** Active Directory integration is optional. Alternatively, admin users can manually add users. Your RadMachine license is not based on your user count, so you can have as many users as you need.Or manually add users, as long as u have permissions.

The user permissions are extensively customizable just like the rest of the software.

**Q:** Can I set up Eclipse as a “machine” to track faults/issues?

**A:** The presenter doesn’t know how RadMachine licensing would work with that, but technically, of course you can set up Eclipse as a unit and then attach QA.

**Q:** Can you add notes before a task is completed? E.g., the lasers were off, but we fixed them in the middle of the test?

**A:** Yes, you can attach a file documenting the laser change. Remember that attaching a file is different from uploading a file to process its data.

**Q:** We do all of our monthly MLC and imaging QA in a singlle session. Truebeam saves these DICOM files to the I: drive. There are many, many files, with nonsense names. How could RadMachine handle this?

**A:** Radformation is happy to work on Truebeam-specific data configuration. But for image analysis in general, you can set a field’s Directory Equivalent. For example, a/b/c means that the local agent will send data from thiat location to that field. (If c is a directory, a zip file will be uploaded.) After upload, the uploaded file(s) are moved to an \_uploaded subdirectory (a/b/c/\_uploaded).

**Q:** How can RadMachine handle multiple components of daily QA, such as Performance Check, DQA3, and Winston-Lutz?

**A:** Again, RadMachine is customizable, so set up your daily QA however you want. You can have three different QA tasks that you must compelte daily, or three components to a single task.

**Q:** How do we get a jig?

**A:** The jig is delivered to your address, free with purchase of RadMachine. The jig allows you to execute QA on multiple pahntoms without goining in and out of the vault.