



SIERRA



GROUND-TRUTH COLOUR STANDARDISATION

FOR PATHOLOGY AI

AI GROUNDED IN REALITY

The ground-truth colours in pathology are real data, from real patients that require diagnostics based upon reality for accurate and reliable healthcare. Only by utilising colour management techniques that have the ability to create standardised and ground-truth coloured images, irrespective of whole slide imaging (WSI) scanner source, will AI truly

be able to make these life-changing decisions with complete colour certainty.

To address these challenges FFEI has developed the Sierra colour calibration product portfolio – correcting colour using a unique biologically stained slide-based device and DICOM compliant ICC colour profile.



ENSURING WSI SYSTEMS PRODUCE IMAGES THAT ACCURATELY REPRESENT THE STAIN USED

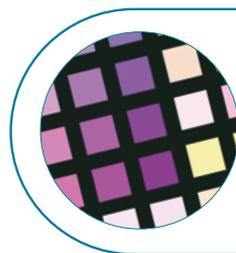
Colour calibration and standardisation is complex. A significant degree of variation in colour exists between different WSI systems. In addition, the method by which WSI systems observe colour is different from the way the human eye does, thus images need to be processed to interpret these differences.

BRINGING COLOUR FIDELITY TO DIGITAL PATHOLOGY DEVICES

Sierra ensures colour fidelity throughout the imaging process. The goal of this is to provide confidence that the colour is representative of the 'true colour' of the tissue sample and not digitally altered by the scanning process. This provides a guarantee that a pathologist, analyst or AI is working from ground-truth, standardised data.

SIERRA PRODUCT PORTFOLIO

MAKING USE OF ICC-STANDARDISED COLOUR PROFILES TO CALIBRATE WSI DEVICES



SIERRA COLOUR CALIBRATION SLIDES

The Sierra slide carries 55 patches of a specialist material that mimics human tissue and is impregnated with various histological stains. This enables the colour error of a scanner to be measured for validation and calibrated to 'real-life' colour data for accurate standardisation.

1



SIERRA VALIDATE & STANDARDISE (VS) ANALYSER

Used in combination with the Sierra slide, Sierra VS-Analyser is a WSI colour validation solution that determines the variances between the colour reproducibility of a particular WSI device and ground truth colour.

2



SIERRA VALIDATE & STANDARDISE (VS) PROFILER

Armed with the Sierra VS-Analyser data, Sierra VS Profiler enables a unique ICC profile to be generated for the device to standardise the colour of the digital images produced, to ground-truth colour.

3



SIERRA CONSULTANCY & BESPOKE DEVELOPMENT

Whether you are a manufacturer looking to ensure ICC grade colour reproducibility from the point of production, or a pharmaceutical looking to standardise your portfolio of devices, we have the expertise to fully integrate Sierra into your workflow.

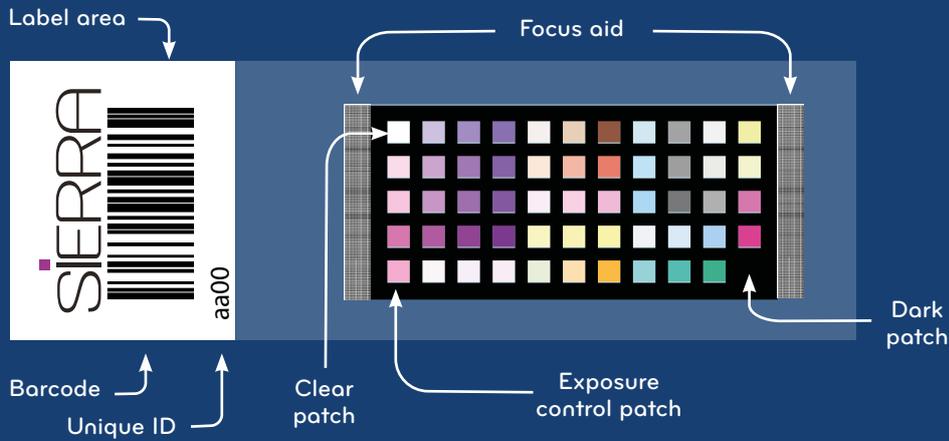
4

THE SIERRA SLIDE*

Formatted like a pathology slide, so compatible with WSI scanners:

- Small patches of biopolymer bind pathology stains = tissue mimicry
- Creates gamut of pathology colours with reduced metamerism
- Stained with same protocol as for pathology

* This device complements the FDA guidelines for interoperability and simple adoption.



WSI DEVICE MANUFACTURERS

Enhance the accuracy of your scanners and the digital images they produce by colour calibrating them to a unique industry standard ICC profile – bring uniformity to images: product range-to-product range, scanner-to-scanner.



AI SOFTWARE DEVELOPERS

Train and run your digital pathology AI software using accurate, standardised data that reflects ground-truth colour – regardless of scanner used or device manufacturer.



PHARMACEUTICAL

Ensure time-to-market efficiency for new pharmaceuticals by ensuring stringent and competitive GLP, allowing for enhanced next-gen data analysis whilst maintaining ROI for current WSI infrastructure.

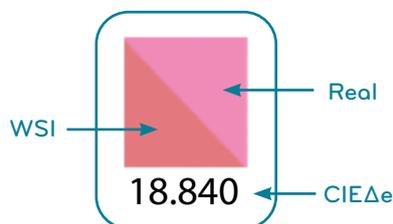
COLOUR UNIFORMITY AND RELIABILITY MAXIMISE AI ACCURACY

No manipulation of pathological data is required for colour fidelity – all images, irrelevant of source, remain digitally unaltered and are of ground-truth colour as standard.

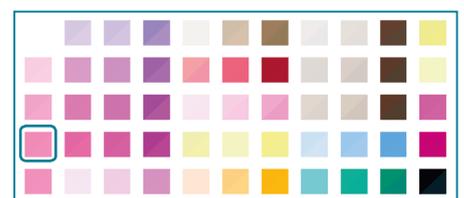
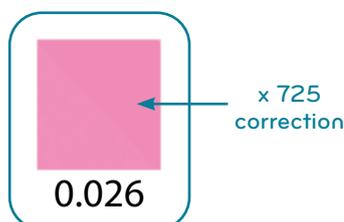
To understand the impact of colour management using this ground-truth calibration slide method, in some instances the colour is improved more than 700+ fold.

It shouldn't be acceptable for a medical device to have over a 700 fold error in any aspect of its function.

BEFORE



AFTER



DEPLOYMENT OPPORTUNITIES FOR SIERRA COLOUR CALIBRATION SLIDE

Often colour calibration is discussed as an 'end of process' activity. In reality colour calibration can be performed at many stages of WSI production and lifecycle.

- **RETRO PROFILING**
Manufacturers can colour calibrate their installed base as part of routine software upgrades.
- **PRODUCTION**
Test and calibrate every scanner at the point of production.
- **TECHNICIANS**
Test and calibrate scanners – check them on a regular basis to ensure accuracy and uniformity.
- **FIELD SERVICE ENGINEERS**
Ensure the entire scanner portfolio remains in calibration alignment.
- **DEVELOPMENT**
Calibrate scanners being used for AI.
- **GO-TO-MARKET**
Facilitate a means of measuring and calibrating all scanners, used by clients, to ensure quality of data and accuracy of AI software.

VALIDATE Sierra VS-Analyser	CALIBRATE Sierra VS-Profiler	STANDARDISE Sierra Slide	INTEGRATE Sierra consultancy
Establish metrics for reporting	Ensure all data produced is of the same quality	Scanner-agnostic interoperability across any end-user devices	Tailored Sierra technology integration
Before/After analysis for dE quantitation and visual qualification	Corrective ICC profiles to international standards	Universal human and AI analysis from real colour, irrelevant of scanner-type, age or location	Bespoke integration of Sierra into pathology workflows or manufacturing processes

FFEI LIFE SCIENCES

FFEI designs and manufactures innovative imaging technologies that enable our partners to fast track their concepts into market leading life science laboratory products.

We have an impressive reputation for developing sophisticated solutions from concept to delivery. Whether the challenge is WSI colour calibration or creating ultra high-resolution micro

scanning mechanisms for digital pathology – FFEI has the capability.



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