TECHNICAL REPORT

ISO/TR 19263-1

First edition
2017-03

Photography — Archiving systems —

Part 1: Best practices for digital image capture of cultural heritage material

Photographie — Systèmes d'archivage —

Partie 1: Meilleures pratiques pour la capture d'images numériques du matériel de patrimoine culturel

Reference number
ISO/TR 19263-1:2017(E)

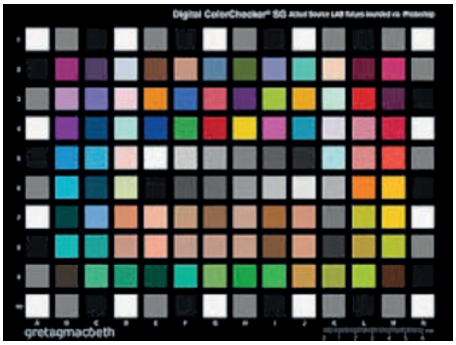

Figure 11 — ICC colour profile

— After having established correct chart illumination and exposure, capture the colour chart. If your software does not support built in ICC colour profiling export the file as a 16bit RGB Tiff in a colour encoding space that is larger gamut than the colour chart you wish to utilize for profiling (Note it is possible to characterize cameras using raw image data, but the process can become complicated due to a lack of standardization for raw data and its interpretation).

— Using any software capable of creating ICC input profiles, follow the manufacturer's steps to generate an ICC profile.

— After loading the ICC input profile, select the profile in the DSC or host control software.

— Re-Verify Neutral Balance, Exposure, and Tone Reproduction (OECF).

— Capture a new chart image and re-check neutral balance, exposure, and tone reproduction. Export the file making sure to embed the custom ICC device profile or working colour encoding space.

5.7 Analyse colour and tone

The image of the colour chart can be compared to the chart reference data manually or via open source or commercial analysis tools. For colour evaluation the ΔE 2000 formula is recommended using a SL 1 in the calculations*. The ΔE 2000 colour difference formula as published was not specifically engineered for scene referred imaging analysis and assumes a non linear transform for lightness that is not appropriate for calculating ΔE values for scene referred imaging applications. Specifically, without modification, the ΔE calculation will report inaccurate ΔE values even when source L^* target values perfectly match L^* values in an image. Ensure that the software you are utilizing for image analysis supports this particular ΔE calculation method.

When configuring an imaging system it is a good idea to validate the capture of a colour chart to its reference data as well as comparing spectral measurements of sample artworks with their representations. It's essential that the chart and reference data are verified or known.

6 Application of image quality analysis

6.1 Selection of imaging systems: preflighting equipment or vendors

The best time to implement an imaging strategy is after your project scope has been clearly defined and the collection has been assessed. If the collection goals are appropriate and the size of original work is known, one can evaluate equipment strictly based upon technical performance criteria and by analysing test targets. Due to the complexity of imaging systems it is common for imaging systems to easily pass certain criteria while failing other criteria, the results of ISO 19264 analyses will help identify and resolve problems. For example: A failure to pass illumination uniformity aims can be traced to the incorrect positioning of a light source. Failure in a single chart MTF region may reveal that the imaging system plane is not parallel to the artwork plane. If an imaging system does not pass certain

criteria, a determination can be made to accept the results or not based on the material to be digitized. If an exception is made, the exception should be documented for future reference.

Taking an objective approach to equipment selection is the most effective way to define equipment needs. It is absolutely critical to evaluate internal or external vendor imaging systems against the pre-defined project criteria. It is all too common for cultural heritage sites to "clone" systems based on polling peer institutions or hardware vendors. Equipment changes too rapidly for this to be a viable approach. If new equipment is to be purchased it needs to be pre-qualified in order to avoid a worst case scenario such as finding out that a newly purchased imaging system does not satisfy project requirements. It is also critical to validate the imaging equipment and workflow BEFORE purchasing or committing to a digitization vendor. Imaging performance criteria may be defined in purchase contract language as well as a specific deliverable for new equipment configuration and installation. ISO 19264-1 is an ideal approach for the qualification of imaging systems as it is based on objective reports that can become part of contractual deliverables.

In the early days of imaging only the most costly systems were capable of high quality digitization. Today users have many options to achieve high quality results using tools readily available worldwide. As long as the digitization system satisfies the quality criteria outlined in ISO 19264-1 image quality will generally be acceptable. It is rare that a project stands alone so cameras and/or scanners need to be considered in context with larger programmatic goals. Smaller institutions may need to identify equipment that is capable of serving multiple applications as opposed to dedicated turnkey imaging systems.

6.2 Using ISO 19264 target: Initial system configuration

System validation is part of the system configuration process. Before one invests the time to configure a new imaging system, or contracts an outside vendor, digitizing and analysing the ISO 19264-1 target chart will provide valuable insight into the systems performance. Most systems require a certain degree of configuration in order to meet predefined quality levels. After configuring the imaging system for uniformity, colour and tone response the ISO 19264-1 target can be re-imaged and these criteria will typically show dramatic improvement. Note: The ISO 19264-1 target colour patches are not designed to validate system colour accuracy-they are incorporated to aid in establishing system baselines and ongoing quality control. The chart is captured and analysed. The analysis helps guide the process of fine-tuning system parameters until the best possible quality has been achieved.

6.3 Using ISO 19264 target: System performance evaluation (benchmarking)

Once the imaging system and or vendor has reached the desired level of imaging performance, the ISO 19264-1 target is utilized to capture and record the performance at a point in time. Typically this would be at the outset of a digitization effort. Once the results have been reported, it is a good time to document and back up all relevant equipment settings, profiles, metadata etc. this will serve as a valuable archival resource in the event of an equipment failure, change in vendor or other variable.

6.4 Using ISO 19264 target: Ongoing performance monitoring

ISO 19264-1 centers on analysing and reporting imaging system performance. It does not require a specific quality control schedule or reporting, this is left to program managers to establish. It is not uncommon to capture and analyse an ISO 19264-1 target chart on a per-system daily basis or even per operator shift basis. In practice, imaging systems and operators can introduce a number of variables that could lead to unpredictable image quality. Systems are analysed against the predefined quality criteria outlined ISO 19264-1. This approach helps ensure that the imaging systems perform well relative to other systems around the world-configured to meet the same criteria.

In practice it is common to first establish that a system meets or exceeds the ISO 19264-1 published tolerances, and then to utilize specific system baselines as a tool to resolve technical issues. In programs with multiple digitization systems each system will have its own "fingerprint" and it is helpful to understand the systems strengths and weaknesses. For example: a camera/copystand configuration is much more susceptible to illumination uniformity issues than a flatbed scanner. A