caddon®

can print | can color

caddon multispectral technology

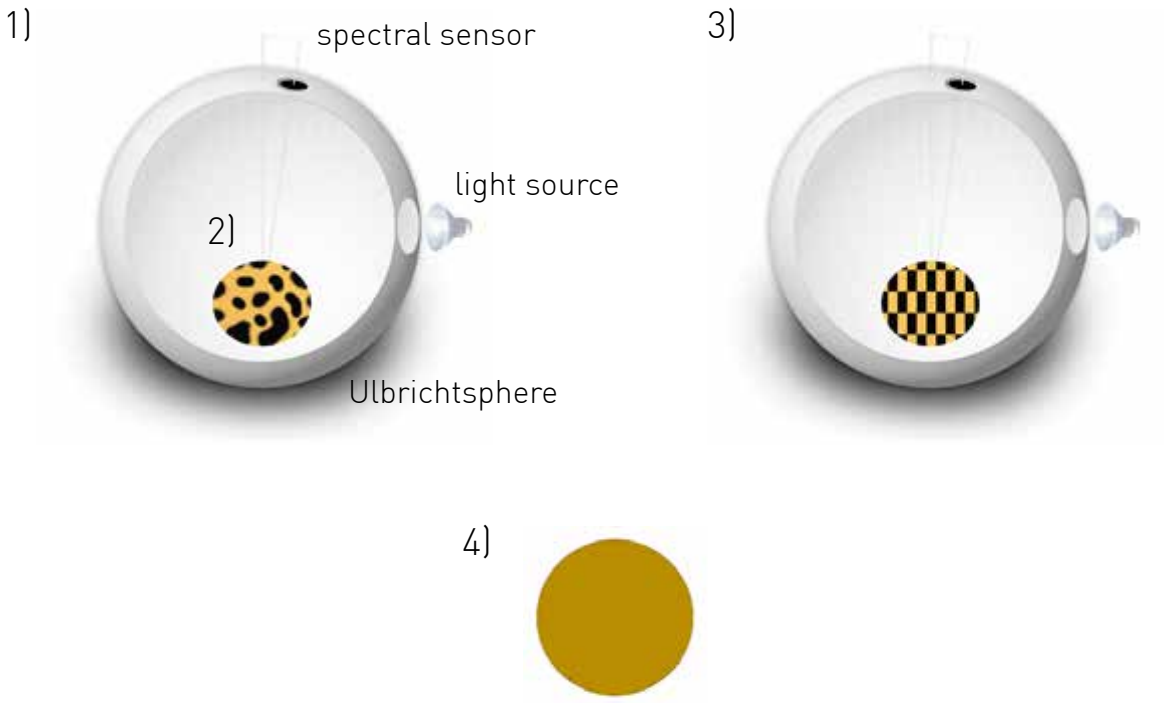
1.0 Introduction

This document explains the benefits of multispectral technology versus spectrophotometric technology.

2.0 Examples illustrating the problem of spectrophotometry

Example 1: complex colour-patterned surfaces

Spectrophotometers do not allow the measurement of complex, color-patterned surfaces (example 1), since their aperture inevitably record several spectra, while determining the average of them, i. e. „single-uni-color" spectral readings. For example, spectrophotometric measurements on different surfaces such as the 2) "leopards-pattern" and the 3) "yellow checkered pattern" may result in the same spectral value.



1) schematic representation of a spectrophotometer

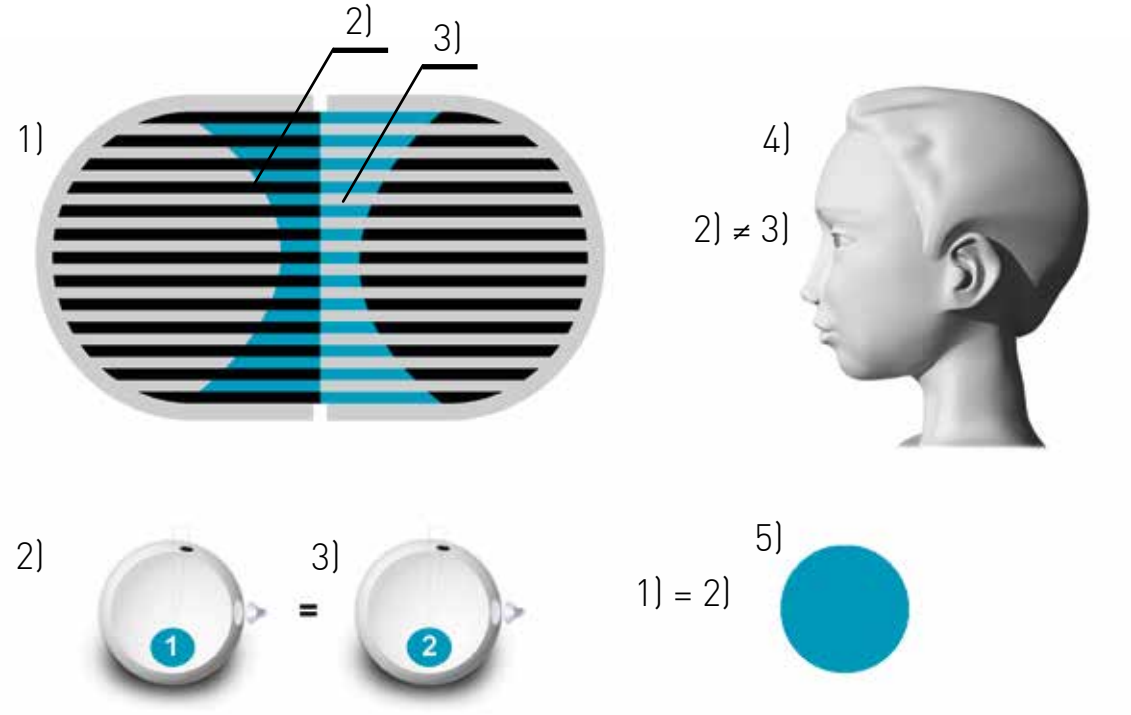
2) „leopards-pattern"

3) „yellow checkered pattern"

4) identical spectral value on both patterns (by coincidence)

In addition, the visual impressions that people perceive often cannot be verified through measurements with a spectrophotometer, since a person's subjective visual impression is greatly affected by influences such as contrasts in colour and brightness, which can't be recorded in a spectral measurement (examples 2 and 3).

Example 2: measure-points 1) and 2) on blue colored fields



1) testpattern simultaneous color contrast

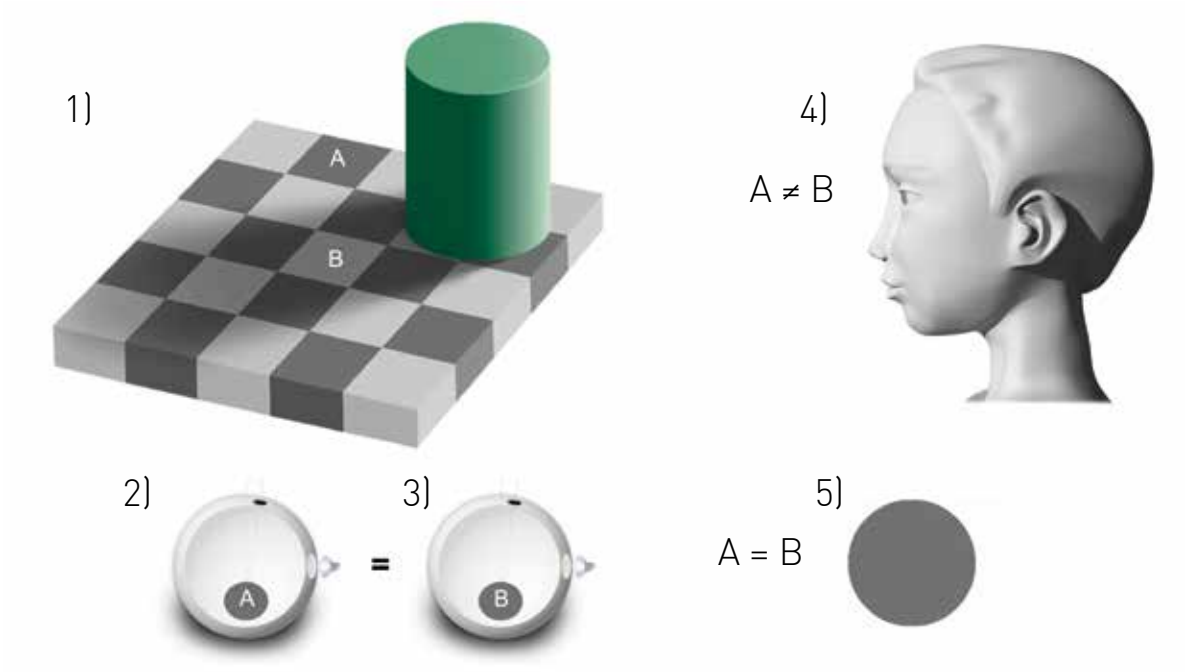
2) measuring point 1

3) measuring point 2

4) observers impression A ≠ B

5) spectral value of 1) and 2)

Example 3: „measurement" on grey fieldB



1) Adelson test-image

2) measurement on field A

3) measurement on field B

4) observers impression A ? B

5) spectral value A is identical to value B

3.0 Solution through multi-spectral technology

Multi-spectral technology combines the technology of a camera with the properties of a spectral photometer. The image conveys the actual visual impression and contains the spectrum of each individual pixel. Using a dataset, both pieces of information are thus inseparable, and reliably available at the same time in different places.

A multi-spectral dataset can be visually assessed and measured at any time at a different location than where the image was made. Image capture and measurement can be divided into two steps.

The example shows the comparison of proof and print versus the digital reference.

The comparison is made through a „motif measurement procedure", i.e., a locally resolved measurement made without the traditional colour control wedge. To allow this to happen, an area was selected on the „Lady" motif (red square) where analysis of the scanned data and the reference file was performed. The proof and printing of the motif were each captured with the can:scan system.

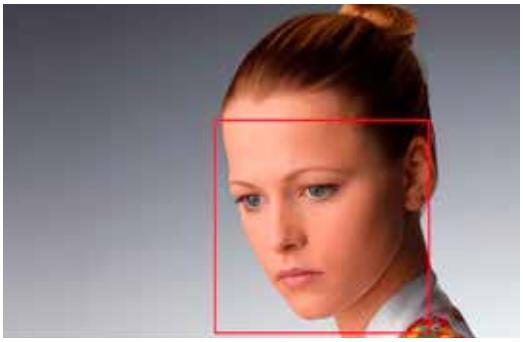
The colour quality was then assessed in the form of a locally resolved CiELab comparison:

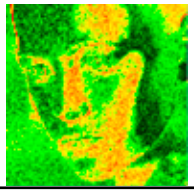
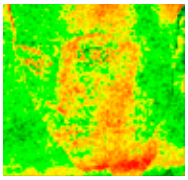
Black: 0.0 CIE ΔE2000

Green: 1.0 CIE ΔE2000

Yellow: 1.5 CIE ΔE2000

Red: >2.0 CIE ΔE2000



Data	Motiv	Colour difference to reference image
Proof		
Print		

4.0 Functional principle of real-time proofing with the caddon can:view system

It is almost impossible to reliably assess colours on a traditional display. Even if the display is perfectly calibrated, the ambient light and colours affect the viewer's perception. Replacing proof printing on a display with soft proofing therefore requires extensive and complex measures.

The Forschungsgesellschaft Druck e.V. (Print Research Association, Fogra) has developed a manual on the establishment and certification of such a soft proofing workplace.

The manual envisages installing a monitor in a standard light rack, which in turn must be located in a room painted in grey. Windows in this room must be covered with special filter film.

Once the room has been set up correctly, the brightness of the standard light rack precisely dimmed to match the display brightness, the display correctly profiled and the angle between the print sheet support, display and standard light panel set precisely, you can have this single workplace certified by Fogra.

The question „Is there not an easier approach, one that is workplace independent and process assured, that is, that does not rely on our setting up each workplace autonomously, and continuously ensuring its reliable continuous operation?" is one that can safely be answered with a „Yes" today.

With the **can:**view, the environmental influences play a less important role, as they can be masked to a great extent with a single action; the residual ambient light is determined and compensated for spectrophotometrically. Logged viewing of the print data therefore occurs under optimal and controlled viewing conditions; in particular, the **can:**view system visualises the multi-spectral patterns generated with the **can:**scan in an unprecedented quality. The **can:**view is the world's only system that is Fogra-certified as a system, without needing individual calibration work. Successfully performing an automated ambient light measurement and profiling, completes the work for setting up the **can:**view.

There is no need to replace bulbs, unlike in a legacy standard lighting system.

In addition, the **can:**view LED light engines have drastically lower reciprocal tolerances (ΔE 0.2 metrologically determined with a Konica Minolta CS 2000) than is the case with conventional fluorescent lighting. These have reciprocal tolerances that are quite easily visible.

The globally patented **can:**view method allows physical patterns to be superimposed directly on the **can:**view display and thus visually compared with their representation on screen over the shortest possible distance.

Media wedges that can be shown on screen provide metrologically logged evidence at the time of print data release. This additionally allows for a logged calibration of the reproduction accuracy between multiple **can:**view systems at different locations in real-time (avoiding the need to mail hardcopy proofs)

This makes caddon's **can:**view sampling workstation the best prerequisite for efficient control and proof processes in the printing industry.

can:scan

Multispectral image-capturing system for accurate colour measurement and colour communication

can:scan is centerpiece of the caddon colour measuring technology. True colour digital samples are defined from physical master samples.

can:scan is that precise as if a spectral photometer would capture each individual pixel combining them to form an image. In contrast to conventional spectral photometers, **can:**scan can capture the colours of complex coloured patterns and structured surfaces, e.g. of wood, leather or textiles.

can:scan can also be used as an excellent measurement device for profiling complex substrates like carpets, concrete slabs, or laminate floors.

Advantages

- Colour true digital samples can be generated quick and easy.
- Highest precision when measuring colours of patterned and structured surfaces such as textiles, plastics, leather and wood.
- Time and cost savings with higest possible quality. Easy, loss-free duplicating and archiving. Fast electronic data transfer.
- Multispectral samples can be distributed via the internet and can be immediately measured at any monitor at the click of a mouse, and also accuratelly displayed with **can:**view.
- Spectral measurement data at any point of the multispectral sample can be reproduced any time (one pixel of a multispectral image is a spectral measurement. A image from x-number of pixels is multispectral).

capture • view • measure • change • communicate!

can:view

Monitor system for colour checking - display and light box combined in one system

Another essential module of our digital colour communication solution ist the **can:**view soft-profing system.

It is almost impossible to asses colours confidently on a common monitor. Even on a perfectly calibrated screen, ambient light and colours affect the viewer's perception. For **can:**view this is not an issue, the environmental influences can be eliminated in a second, remaining residual ambient light is calculated and compensated for.

can:view is the world's only system allowing individual colorimetric calibration of the observer, considering the viewer's individual colour perception. This way, pre-press data can be displayed under optimal and reproducable conditions as "softproofs". Multispectral samples created with the **can:**scan are depicted on the **can:**view system in unrivalled quality.

can:view is the world's only system that can process not only traditional data for pre press but also multispectral images. The **can:**view world wide patented procedures allows physical samples to be directly placed on the screen for comparison with the displayed digital samples.**can:**view offers the best method of ensuring strict controls and colour proofing processes in the graphic industry and production.

Colour control directly on the screen

can:view displays multispectral images in true colour under standardised light conditions. Using the **can:**connect software, various types of light can be calculated and displayed in the system. This shows the observer at a glance what the colour or design is going to look like in the designer's office, for instance, in the production hall or in the neon light of the department store.

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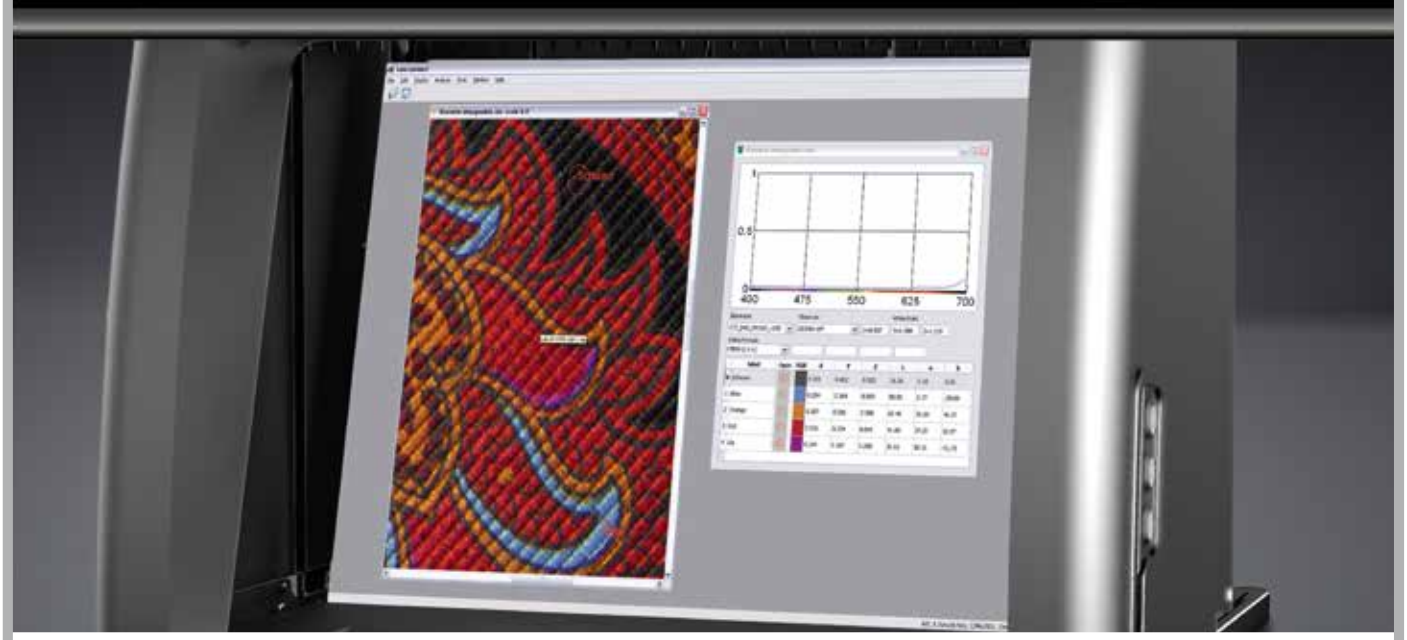

can:connect

The software system for processing and comparinng multispectral datasets

can:connect controls the components **can:**scan and **can:**view allowing the user to evaluate and compare multispectral datasets as well as to create mesurement protocols. **can:**connect offers spectral information for every pixel of the measured objects surface. Colour-shifting of patterned surfaces due to changing ligth conditions or observer metamerism can therefore be easily detected and evaluated.

can:connect analyses the spectra measured with **can:**scan outputing them as CIELAB-values to each monitor. Since the human eye perceives colours differently depending on the particular light conditions, **can:**connect also takes into account the effect of residual ambient light the monitor is exposed to at the location of the **can:**view. The software also visualises metameric effects. Means, **can:**view can immediately distinguish if two colour tones looking identical under a standard lightsource will differ under another type of illumination.

Advantages

- Exact measurements of complex, patterned surfaces anywhere, any time where **can:**connect is available.
- Freely variable measuring points (from one pixel to complete image area).
- Display of digital patterns for various light sources and observers.
- Image export for various illuminant/observer combinations (.aix to L*a*b*-TIFF, 8/16 bit).
- Simple operation for use in quality control.
- Assesment using a simplified traffic light system „passed/failed".
- Detailed and comprehensive measuring report supplied as quality verification for the customer.
- Full automatised and very efficient chart reader for ICC profile creation - especially for profiling complex patterned substrates.
- Supports all standard measurement file formats (*.iso, *.txt, *.cxf, *.qtx etc).

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can:change

The colour correction plug-in for Adobe Photoshop™

can:change is a part of the **color:**communication system from caddon. It allows objective and precise colour correction of photos by measuring all colour tones of a multispectral sample and transferring this to the photo of the original. This results in a fully objective colour correction.

can:change gives the retoucher reliable information to quickly and efficiently transfer the correct colour and light situations from digital swatches to retouched photos. This takes trial and error out of the process and saves time, making **can:**change an indispensable tool for retouching images, espacially in the fields of image databases and catalogue production.

The Adobe Photoshop™ plug-in **can:**change thus perfectly complements the measuring device **can:**scan and the norm light viewing system **can:**view.

* The caddon **color:**communication system consists of several software and hardware components which can also be used independently of each other, depending on application.

Advantages

- The original physical samples no longer need to be sent to the pre-press.
- Images can be processed directly after the shooting.
- The colour correction process takes place in one medium (e.g. Adobe Photoshop™ and a monitor). It's no longer necessary to transfer the colour from a reflected light reference to the monitor, as the colour reference is now also displayed on the screen.
- Your colour references can simply be electronically archived.
- You will achieve a standardised, efficient and objective workflow within the image processing and colour correction processes, with consistently high quality colour accuracy.
- **can:**change combines all beneficial functions required for image colour correction.
- Avaulable for Mac (Intel) and PC.

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