The DIAS™ is an innovative instrument designed to measure the DOI (Distinctness of Image) of media and prints. As digital printing becomes more mainstream in the photography market, DOI is recognized as an important attribute that often influences the customer's perception of "photo-quality." The DIAS™ measures DOI using an innovative edge-projection technology, wherein reflection sharpness data indicating image clarity is collected, analyzed, and reported within seconds. This information is critical to quantifying ink and media quality for quality control and R&D applications.

Overview

DOI is the sharpness and clarity of an image reflected from a print or media surface as illustrated in the example shown in Figure 1. In this example, the reflection of a window blind and a potted plant is observed on two inkjet-printed media placed by a windowsill. As shown, the reflection in Print A is sharp and clear, indicative of a high DOI surface; whereas the reflection in Print B is blurry and fuzzy, indicative of a low DOI surface. Such clarity of reflection is an attribute associated with the "finish" of a photograph, which in combination with other attributes such as color and gloss, determine a customer's overall perception of "photo-quality."

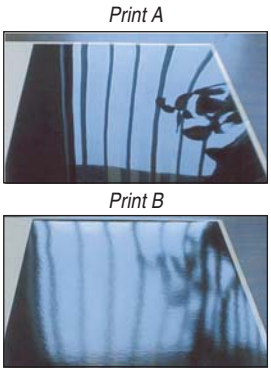

Figure 1. Illustration of high (A) and low (B) DOI

Many digital prints have poor DOI, resulting in customers not accepting them as "real" photographs. Being able to quantify DOI is therefore one of the key factors in improving DOI and customer acceptance of digital photographs.

The DIAS™ is a hand-held instrument designed to quantify DOI conveniently, objectively, and reproducibly. It is typically used as a standalone instrument; but data and images can also be transferred to a PC via a USB interface. The DIAS™ simulates our visual experience of DOI by projecting a sharp edge onto the sample-under-test and captures the reflection by means of a high-resolution CCD camera built into the instrument. Examples of the reflections captured from a high and a low DOI sample respectively are illustrated in Figure 2. The DIAS™ computes DOI in terms of sharpness and blurriness of the edge in these reflections using the built-in image analysis software.

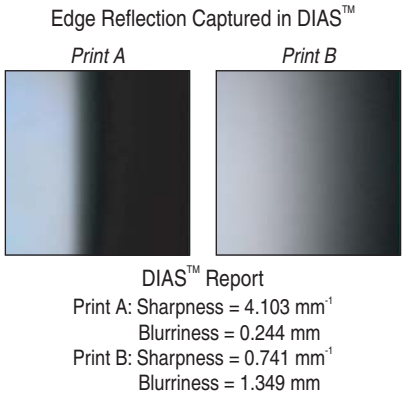

Figure 2. Reflection of a sharp edge projection on a high (A) and low (B) DOI sample

DOI Measurements

- Blurriness (mm)
- Sharpness (mm^{-1})
- Peak (% per mm)
- Maximum reflectance (%)

QEA IAS® Product Family for Print Quality Evaluation

Personal IAS	Portable image analysis system
Spectrophotometer Kit	Portable Pocket PC-based spectrophotometer
DIAS	Portable DOI analysis system
Scanner IAS	Scanner-based image analysis system
IAS-1000	Automated camera-based image analysis

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System Specifications*

Functional Data

Description	Portable distinctness of image (DOI) measurement device. DOI determined from an edge spread function and reported as blurriness and sharpness
DOI Measurement	Blurriness (mm) Sharpness (mm^{-1}) Peak (% per mm) Maximum reflectance (%)
Software Features	Numerical data display Running statistics and data logging Live video DOI display Graphical display of edge spread function Image and profile saving
Data Storage & Handling	PC-compatible files of raw data and analyzed results (as text files from data logging or individual data saving) ActiveSync file transfer with laptop or PC

Technical Specifications

Sensor	Color CCD
Resolution	5µm per pixel
Aperture Size	2.4mm × 2.4mm
Blurriness Repeatability	± 3%†
Blurriness Reproducibility	± 5%†
Blurriness Range	0.06 ~ 2.5mm
Calibration	Factory calibrated
Measuring Time	2 seconds (user selectable)

Physical Specifications

Display	Hyper amorphous silicon TFT color LCD (320×240)
Accessories	Hard-sided carrying case AC power adapter Measurement platform Reference sample USB cable User's manual Backup software
Power Requirements	Rechargeable battery AC power adapter included
Instrument Size	263.5mm (L) × 95.3mm (W) × 57.2mm (H) [10.4" (L) × 3.75" (W) × 2.25" (H)]
Instrument Weight	870gm [1 lb 15 oz]
Shipping Size and Weight	460cm (L) × 38cm (W) × 23cm (H) [18" (L) × 15" (W) × 9" (W)] 3.6kg [8 lbs]

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*Specifications subject to change without notice Rev. 2.3 12/05
†Performance data was taken by DIAS™ using 4th setting of the measurement time.