

# PIAS<sup>®</sup>-II

Personal Image Analysis System



Print Quality Measurements  
anytime, anywhere

⇒ objective, reliable, easy ⇐

Innovative measurement instruments from **qea**



# PIAS<sup>®</sup>-II

Personal Image Analysis System

**PIAS<sup>®</sup>-II** is QEA's cutting-edge portable measurement device for objective image quality analysis. With the PIAS<sup>®</sup>-II, image evaluation is objective and unambiguous – and ready when you need it, where you need it.

With the PIAS<sup>®</sup>-II you share images, opinions and ideas in real time, revolutionizing the dynamics of image evaluation. Connected to the Internet through your PC, the PIAS<sup>®</sup>-II eliminates time and distance barriers: you no longer rely on someone else's descriptions – now you're looking at the same images at the same time.

Above all, the PIAS<sup>®</sup>-II is an analysis tool you can depend on. Measurements are calibrated. International image quality standards are built into test algorithms. And the advanced, comprehensive image analysis software offers all the advantages of QEA's years of research and application know-how.

**An advanced decision-making tool for all.** Quantitative image analysis and quality evaluation are not just for specialists in the laboratory anymore. Whether in the lab or in the field, the PIAS<sup>®</sup>-II makes objective image quality analysis easy and affordable. Now you can observe quality, analyze quality and make critical decisions anytime, anywhere.

## Features and Highlights

- High-performance digital camera interfaces to PC via high-speed USB 2.0; no battery or external power required
- Two interchangeable optics for reflective measurements with built-in visible illumination: a high-resolution, high-precision module and a low-resolution, large field of view module
- Optional optics with UV or IR illumination
- Spatial and density calibrated
- Real-time analysis based on ISO-13660 and other international standards
- Comprehensive library of analysis tools from QEA's IASLab™ software
- Easy and quick transfer of data and images to Excel or other applications
- Ability to save images as bitmaps
- Analysis of saved images in a range of file formats
- Flexible design for future HW and SW upgrades
- Affordable price
- Portable, ergonomic design
- Companion products: transmissive measurements (FlexoIAS™-II), DOI (Distinctness of Image), gloss and gloss uniformity measurements (DIAS™-II)

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# PIAS®-II

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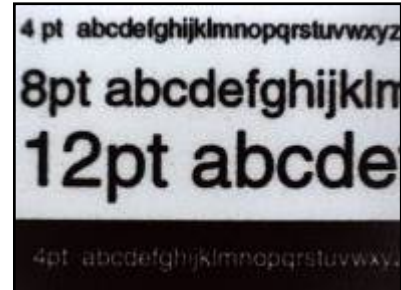
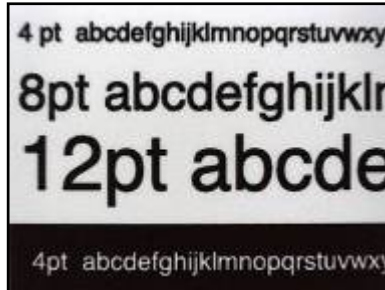
## PIAS®-II – A Digital Loupe

### Application Examples



*Technology  
Benchmarking*

*Printing System  
Design*



*Ink-Media  
R&D and QC*

*Problem Solving  
for Forensic Analysis*



- The PIAS®-II as a digital loupe is revolutionizing image quality communication. The ability to display high-resolution images in real time enables instantaneous sharing of perception and opinion. The old fashioned loupe is a thing of the past.

*Innovative measurement instruments from*





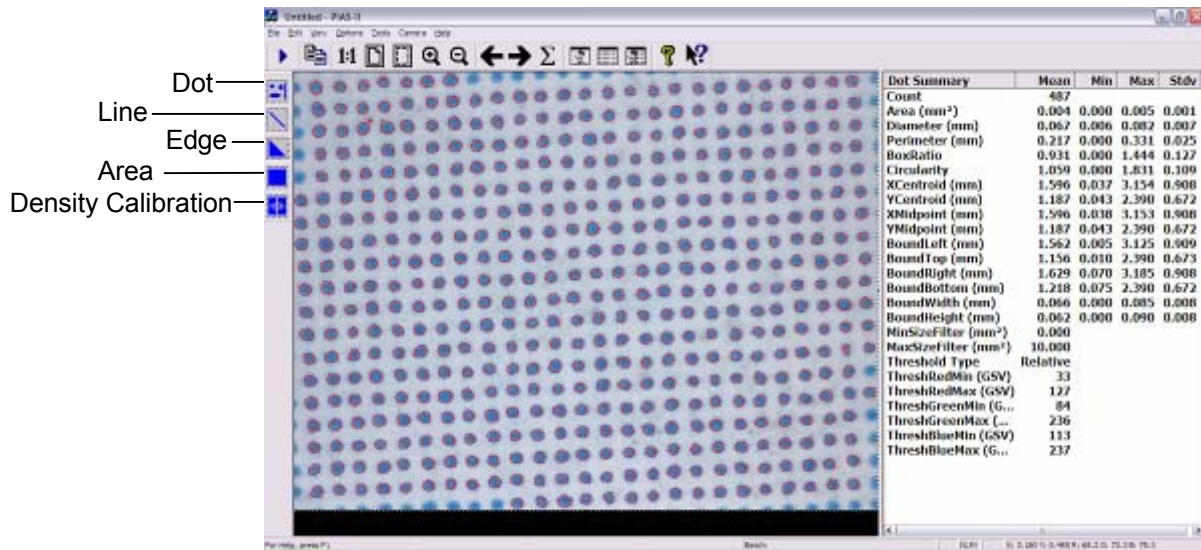


# PIAS<sup>®</sup>-II

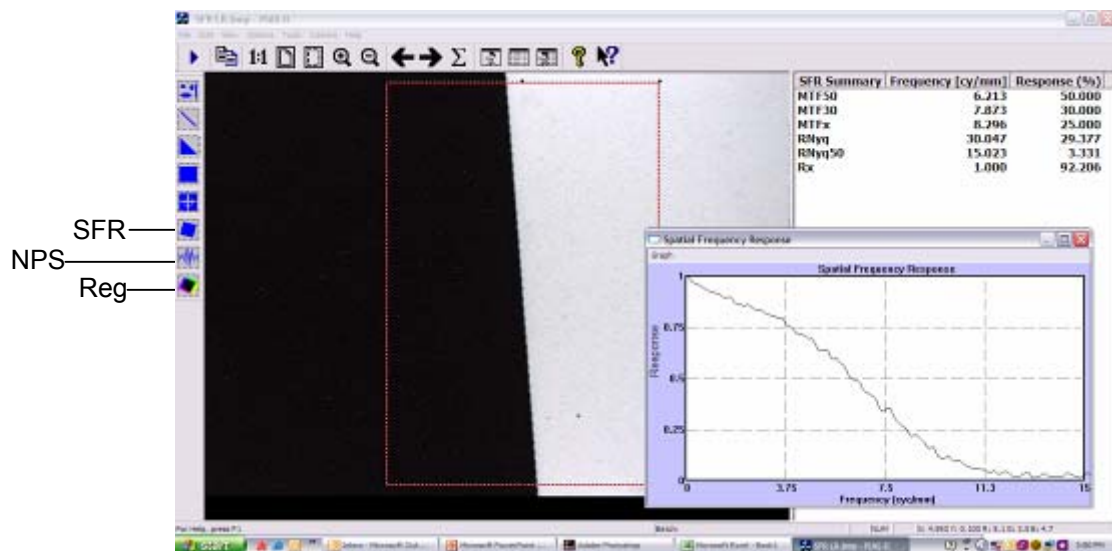
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## PIAS<sup>®</sup>-II – An Advanced Analytical Tool

**Standard Toolbox:** Dot, Line, Edge, Area Properties and Density Calibration



**Advanced Toolbox:** All the standard tools plus SFR (spatial frequency response), NPS (noise power spectrum) and Reg (color registration using SFR method)



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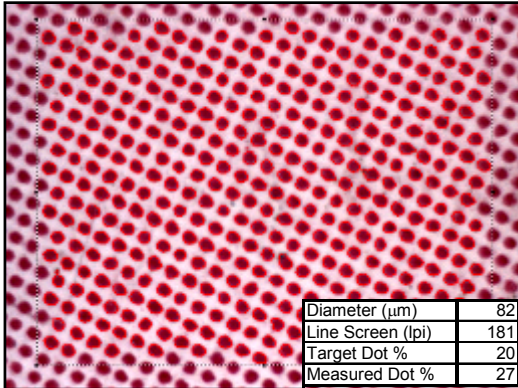


# PIAS<sup>®</sup>-II

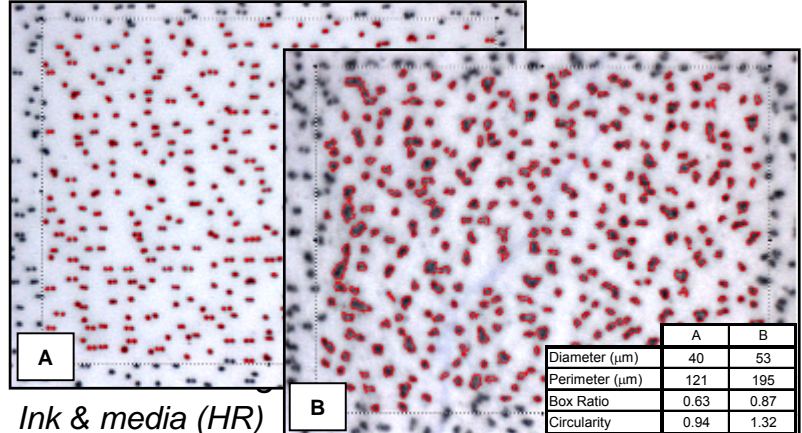
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## Measuring Dot Properties

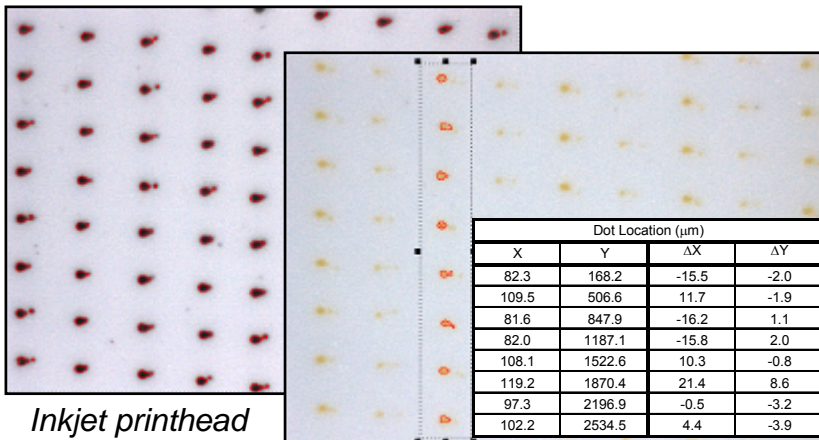
Application Examples (LR=Low Resolution Optics; HR=High Resolution Optics)



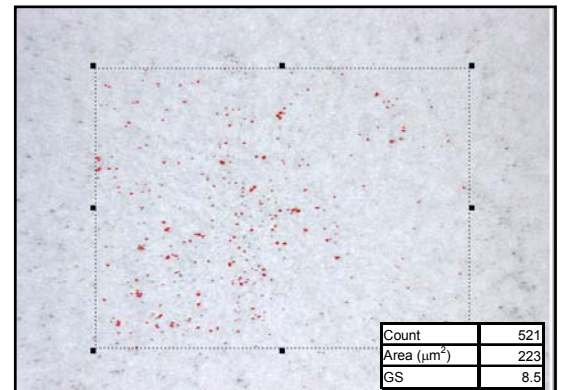
Halftone & dot gain (HR)



Ink & media (HR)



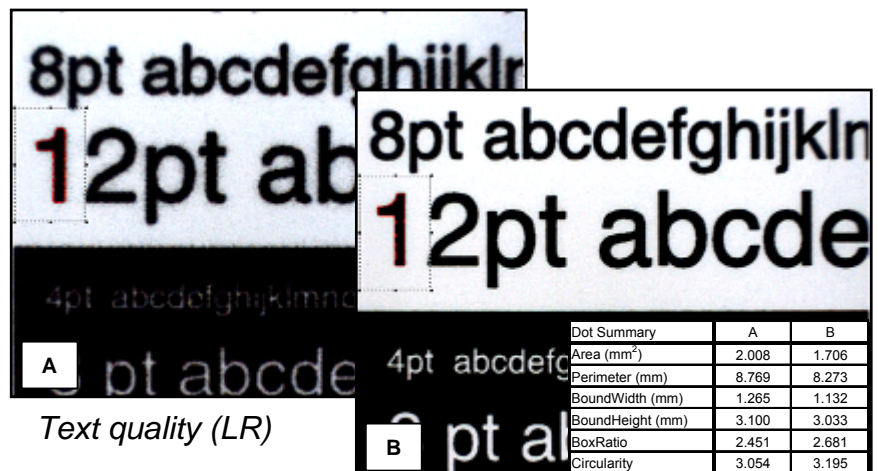
Inkjet printhead (HR)



Background & satellites (HR)



Feature identification & analysis (LR)



Text quality (LR)

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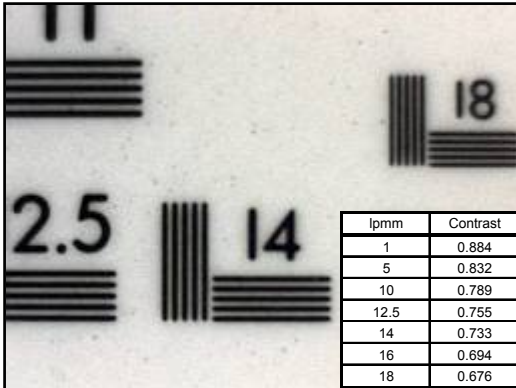


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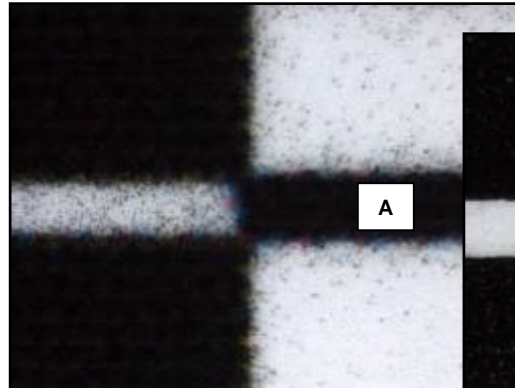
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## Measuring Line Properties

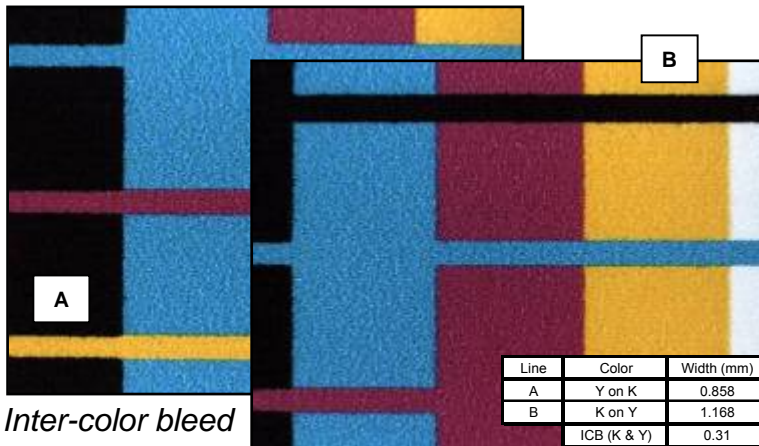
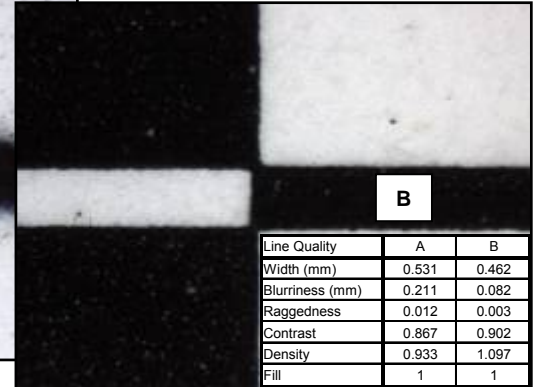
Application Examples (LR=Low Resolution Optics; HR=High Resolution Optics)



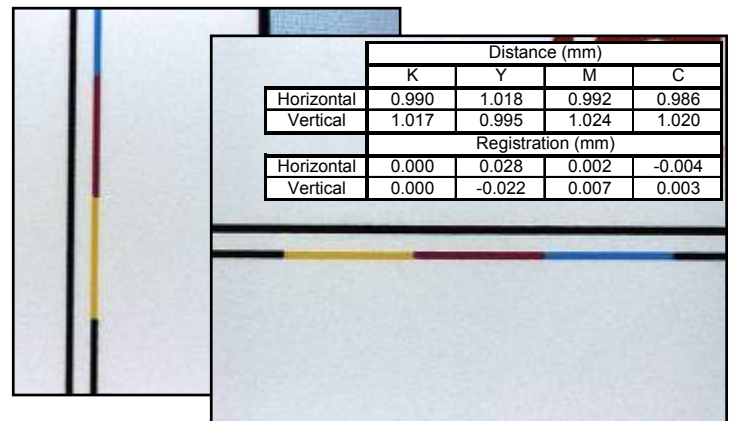
Contrast and resolution (HR)



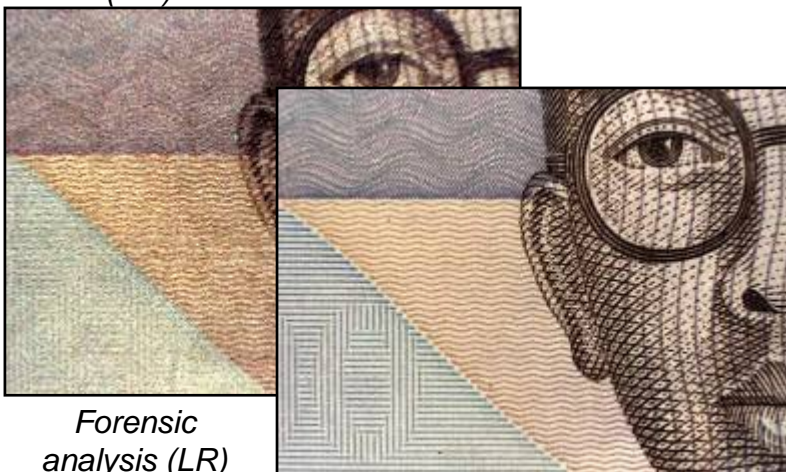
Bleed, blurriness, raggedness & darkness (HR)



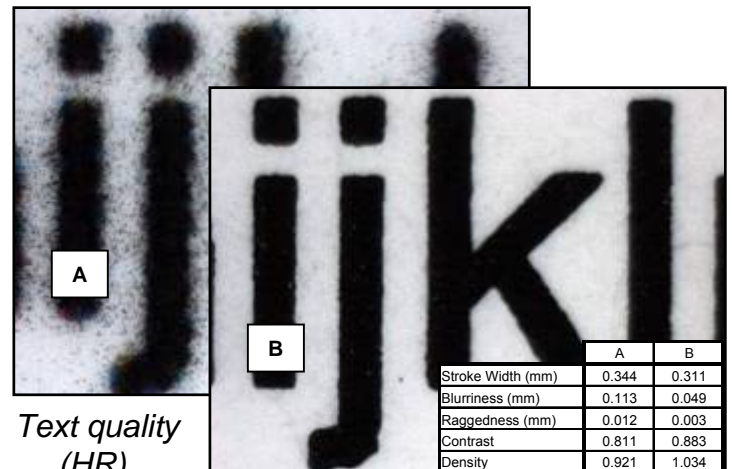
Inter-color bleed (HR)



Color registration (HR)



Forensic analysis (LR)



Text quality (HR)

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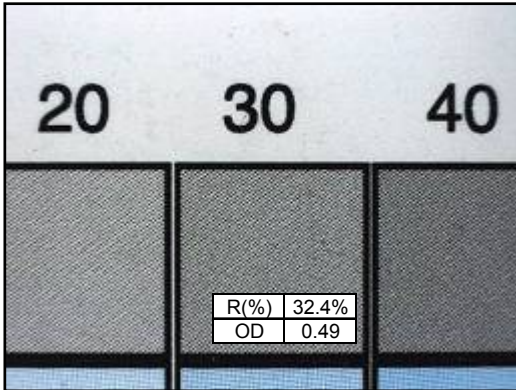


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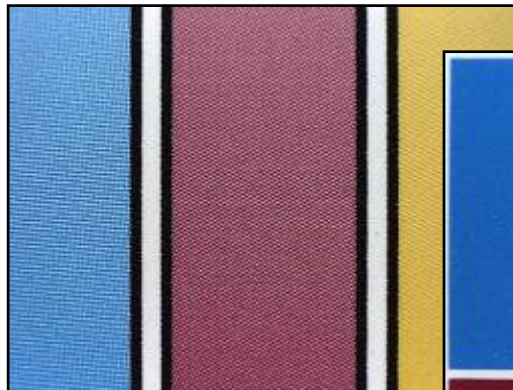
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## Measuring Area Properties

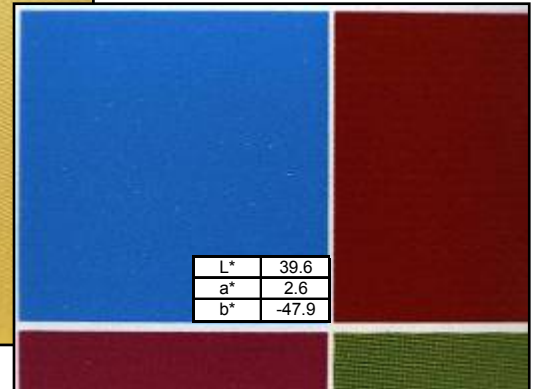
Application Examples (LR=Low Resolution Optics; HR=High Resolution Optics)



Reflectance, density & tone reproduction (LR)

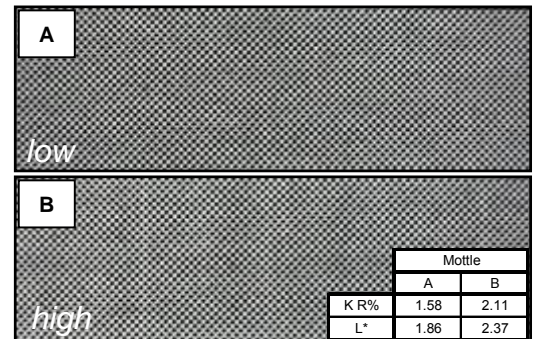


Color - XYZ & L\*a\*b\* (LR)

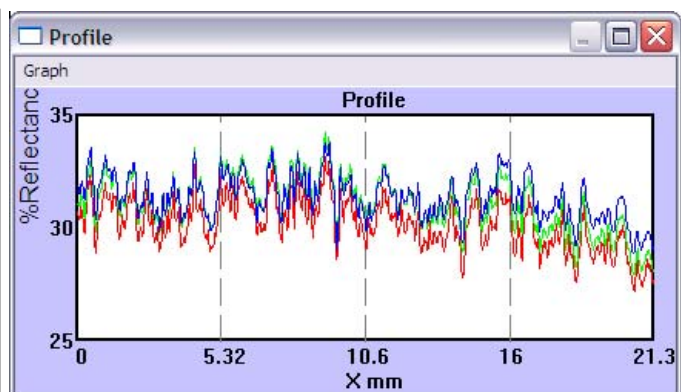
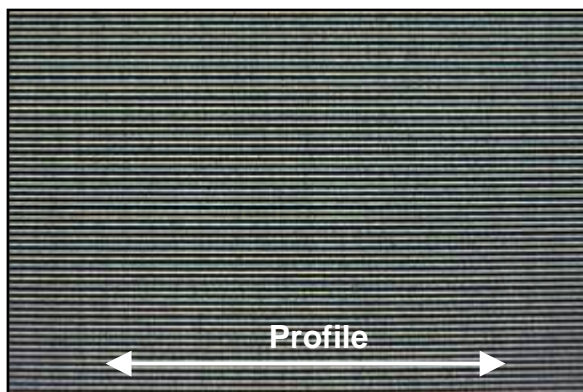


Graininess (LR)

Mottle (LR)



Mottle (LR)



Reflectance profile (LR)

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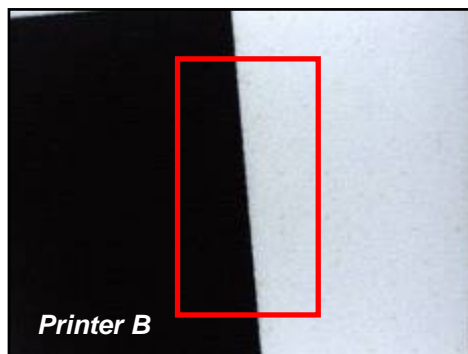
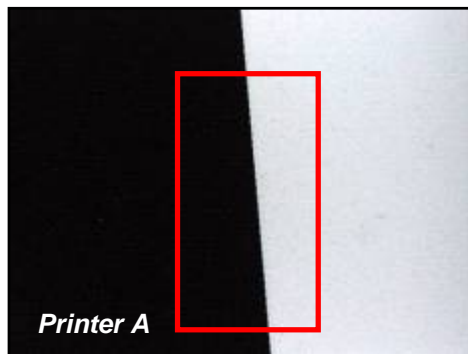


## Advanced PQ Analysis Tools: SFR

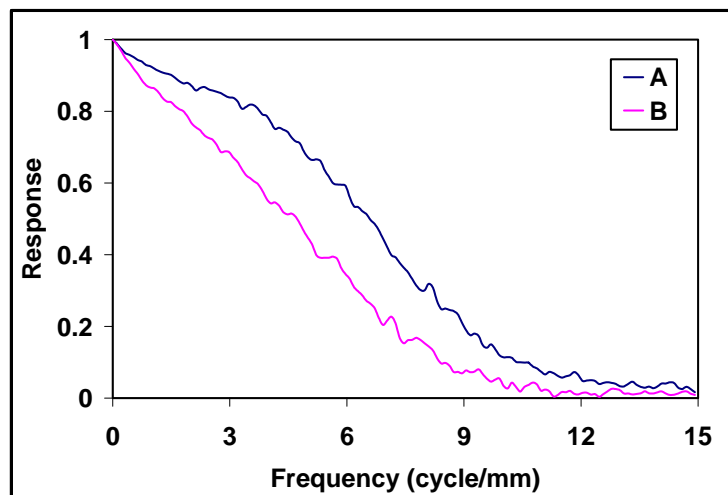
### SFR (Spatial Frequency Response) – ISO12233:2000

- Uses Fourier techniques to measure the spatial frequency response to a slanted edge.
- The slanted edge causes the edge gradient to be measured at many phases relative to the sensor, eliminating aliasing effects.
- Interpretation and analysis of SFR curve is the same as MTF (Modulation Transfer Function)

#### Example:



**Spatial Frequency Response**



*In the figures to the left, the edge produced by Printer A appears sharper. The SFR curves suggest that Printer A has higher contrast than Printer B at all frequencies.*



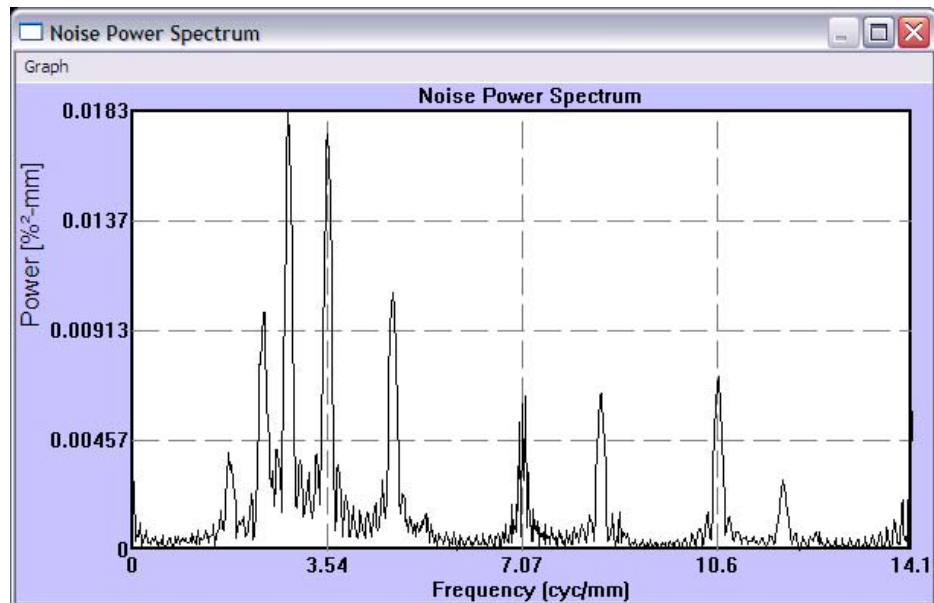
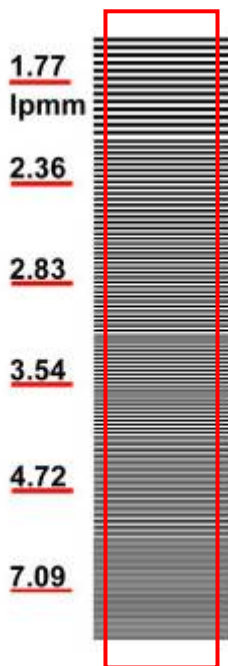


## Advanced PQ Analysis Tools: NPS

### NPS (Noise Power Spectrum)

- Performs Fourier transform of the auto-correlation function.
- When applied to a spatial image, this is often called the “Wiener Spectrum.” In practical terms, the Wiener Spectrum measures the noise variance at each spatial frequency.
- The area under the NPS curve equals the total variance of the image ( $\sigma^2$ ).

### Example:



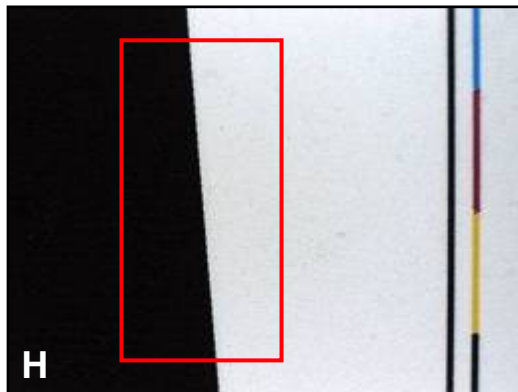


## Advanced PQ Analysis Tools: Color Registration

### REG (Color Registration)

- Target is a slant edge black/white transition.
- In an ideal system, the transition would occur at the same spatial coordinate in all color planes.
- In this analysis, the relative location of the transition in each of the color planes is reported.

### Example:



Registration Error (mm)			
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	H Direction		
	Red	Green	Blue
Red	0	0.002	-0.002
Green	-0.002	0	-0.004
Blue	0.002	0.004	0

	V Direction		
	Red	Green	Blue
Red	0	0.014	-0.014
Green	-0.014	0	-0.029
Blue	0.014	0.029	0





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## Specifications\*

<b>System configuration</b>	Camera module with two interchangeable optics modules Advanced IASLab™ image quality analysis software CD with installation software and documentation Compact carrying case
<b>Camera Module</b>	Color CCD (standard module is VGA at 640x480) Other pixel counts optional (e.g, XGA at 1024x768)
<b>Optics Module</b>	Standard package includes two (2) interchangeable modules: a high resolution module (~ 5µm/pixel) and a low resolution module (~ 37µm/pixel), each with built-in visible illumination. Optics modules with UV or IR illumination optional
<b>Field of View (FOV)</b>	High resolution module: ~ 3.2mm x 2.4mm; low resolution module: ~ 24mm x 18mm
<b>Illumination</b>	Standard visible illumination: white LED ring light at reflective, 45/0 geometry
<b>Interface</b>	USB 2.0
<b>PC Requirement</b>	PC with Windows XP or Vista operating system
<b>Power requirement</b>	Supplied by PC via USB; no battery required
<b>Calibrations</b>	Spatial (dimension) and reflectance (optical density)
<b>IASLab™ Image Quality Analysis Software</b>	<p>PIAS<sup>®</sup>-II's IASLab™ Image Quality Analysis Software provides the following capabilities and tools:</p> <p><b>Digital loupe</b> with image save, open, zoom, and pixel RGB and xy locations</p> <p><b>General purpose image quality analysis toolbox:</b></p> <p><b>Dot &amp; halftone attributes:</b> count, area, diameter, perimeter, box ratio, circularity, density &amp; color in calibrated spaces, dot%, line screen, screen angle, xy coordinates, bounding box, color, size, box ratio &amp; and circularity filters, absolute or relative thresholds, dilation-erosion, contour saving, boundary dot exclusion, background or satellite tool</p> <p><b>Line and edge attributes (ISO-13660):</b> width, blurriness, raggedness, contrast, fill, density &amp; color in calibrated spaces, line breaks, orientation, distance, xy coordinates, color plane, orientation &amp; polarity; user-specifiable parameters</p> <p><b>Area attributes (ISO-13660):</b> RGB, reflectance, density, XYZ, L*a*b*, graininess, mottle in available color spaces; density standards: status A, status T, DIN, DIN NB, visual; color illuminants &amp; observers: A, B, C, D50, D55, D65, D75, E, 2° and 10°</p> <p><b>Others:</b> ROI definition; image and data copy, save and print; zoom; color channel selection; overlay; profile; histogram; image flip or rotate; result display &amp; font control</p> <p><b>Advanced functions:</b></p> <p><b>SFR</b> (Spatial Frequency Response)</p> <p><b>NPS</b> (Noise Power Spectrum)</p> <p><b>Banding</b> (Banding analysis, similar to NPS, with user-selectable VTF filtering)</p> <p><b>Streak Analysis</b> (with user-selectable VTF filtering)</p> <p><b>Profile Tool</b> (with statistics)</p> <p><b>Reg</b> (Color Registration using the slant edge method)</p>

\* Subject to change without notice.

Rev 2.0 080923

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