How International Standards affect Camera Testing

October 2008

In the beginning

- When I started testing cameras in 1997 I sat there and asked myself: how the hell shall I do that?

The unlimited number of standards

Isn‘t there a standard method how to test cameras?

There are several:

ISO 12231:	Terminology
ISO 12232:	Determination of ISO speed
ISO 12233:	Resolution measurements
ISO 12234:	Removable memory -
	Part 1: Basic removable memory reference model
	Part 2: Image data format - TIFF/EP
ISO 14524:	Methods for measuring opto-electronic conversion functions (OECF)
ISO 15739:	Noise measurements
ISO 15740:	Picture Transfer Protocol (PTP) for Digital Still Photography Devices

The unlimited number of standards

ISO 15781:	Measuring shooting time lag, shutter release time lag, shooting rate, and start-up time
ISO 17321:	Graphic technology and photography Colour characterisation of digital still cameras Part 1: Stimuli, metrology, and test procedures
ISO 20462:	Psychophysical experimental method to estimate image quality
	Part 1: Overview of psychophysical elements
	Part 2: Triplet comparison method
	Part 3: Quality ruler method
ISO 22028	Extended colour encodings for digital image storage, manipulation and interchange Part 1: Architecture and requirements
	Part 2: ROMM RGB
	Part 3: RIMM RGB
	Part 4: ECI RGB

The unlimited number of standards

Standardisation committees:

- International Organization for Standardization (ISO) Technical Commitee (TC) 42, Working Group 18
- Cell Phone Image Quality Group organized by International Imaging Industry Association (I3A)
- International Electrotechnical Commission (IEC) Technical Commitee (TC) 100
- Related Organisations: ICC, CIE, SMPTE

Digital Camera Tests

Values which can be measured:

- Resolution (s)
- Dynamic Range (s)
- Used digital values (s)
- Noise (s)
- Color Reproduction (s)
- White Balance (s)
- Vignetting (s)
- Distortion (s)
- Power consumption
- Dead Pixels

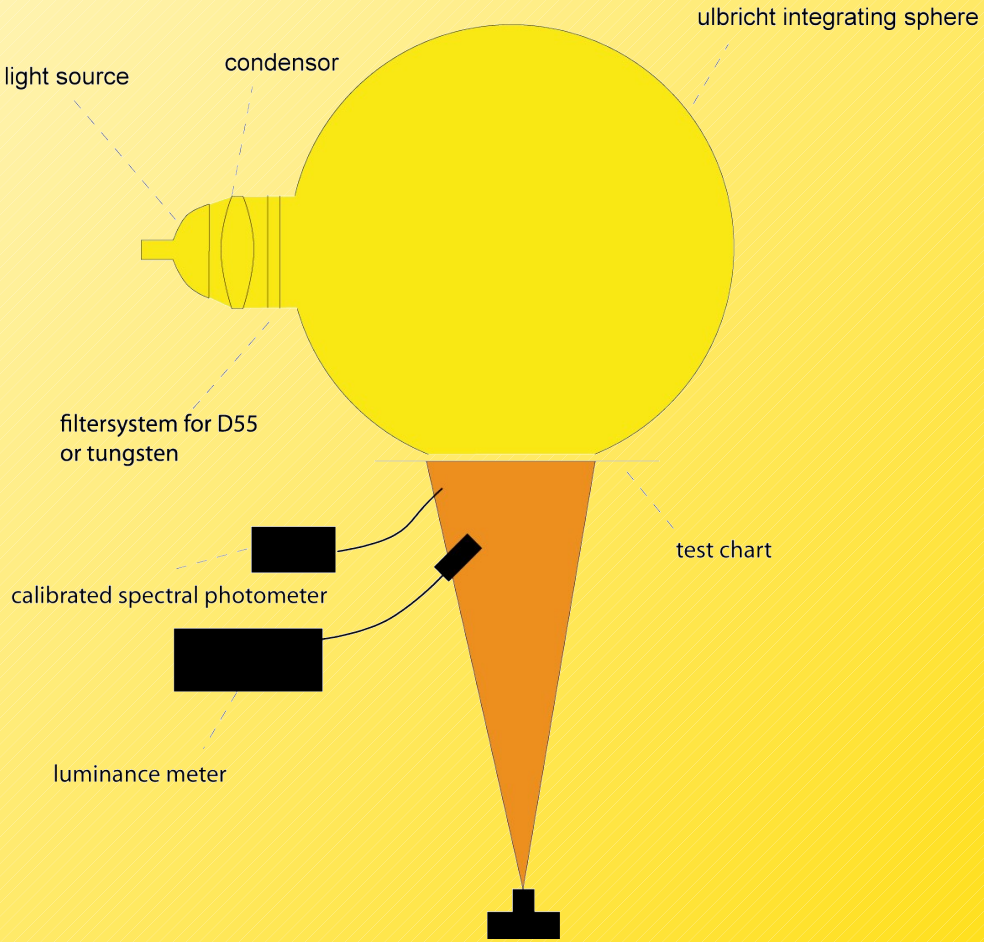
Digital Camera Tests

Values which can be measured:

- Max. scaling
- Flash uniformity and guide number
- Lateral chromatic aberration (s)
- Color shading
- Noise based on human perception (s?)
- Shutter and shooting lag (s?)
- Startup time and shooting rate (s?)
- Image stabilization (s?)

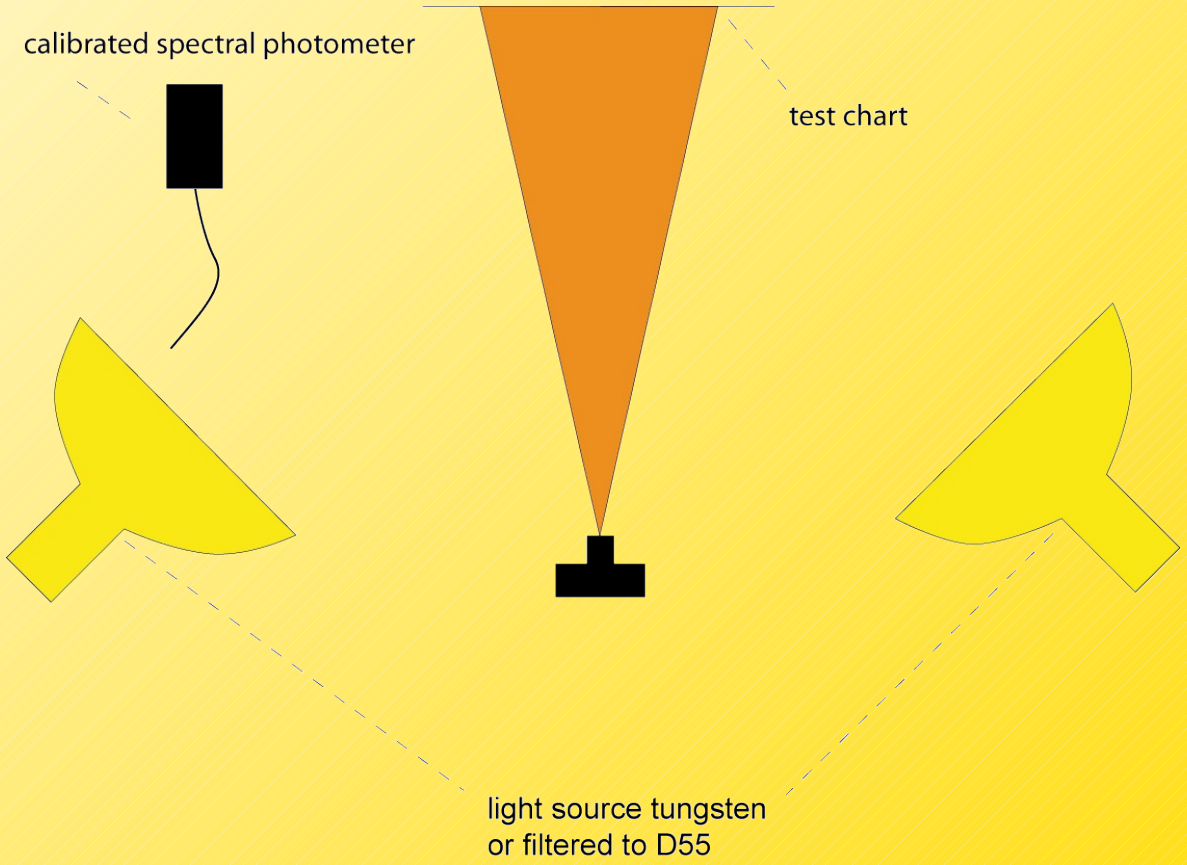
Digital Camera Tests

- Principle



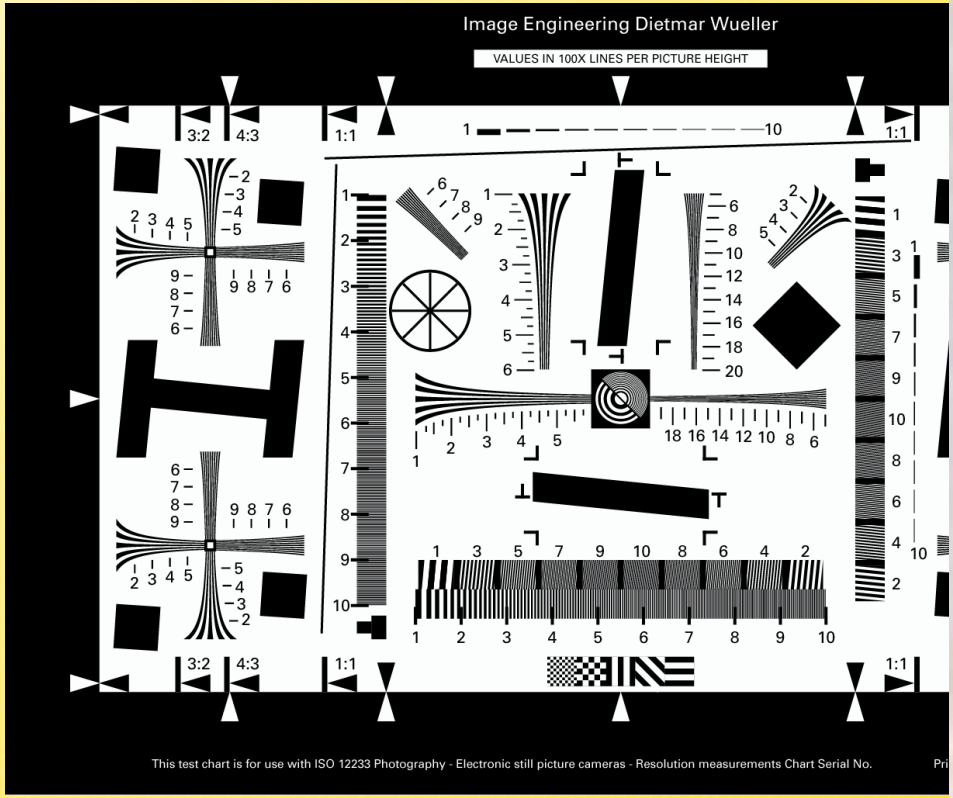
Digital Camera Tests

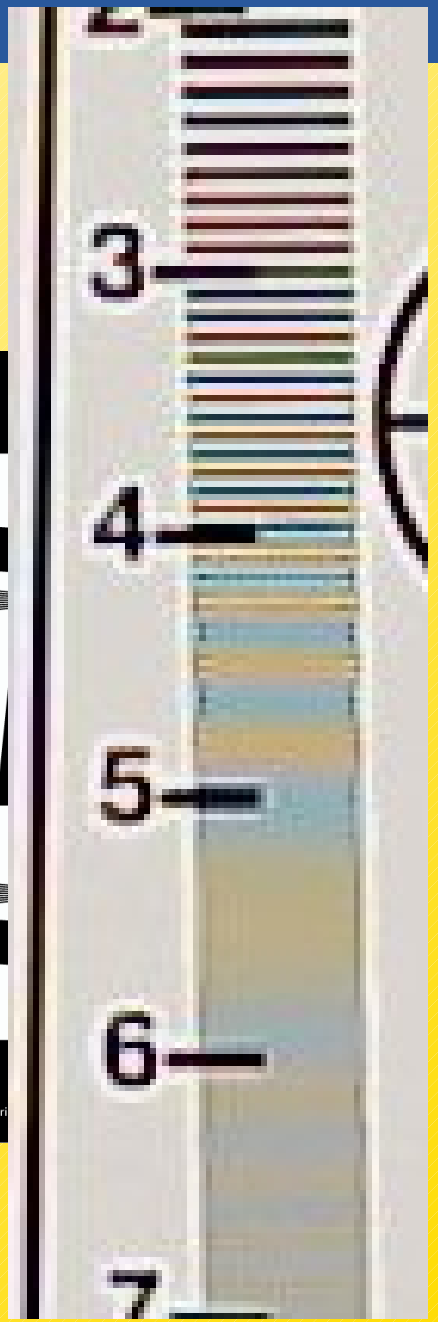
- Principle



Standards are not God given

- Several problems occured





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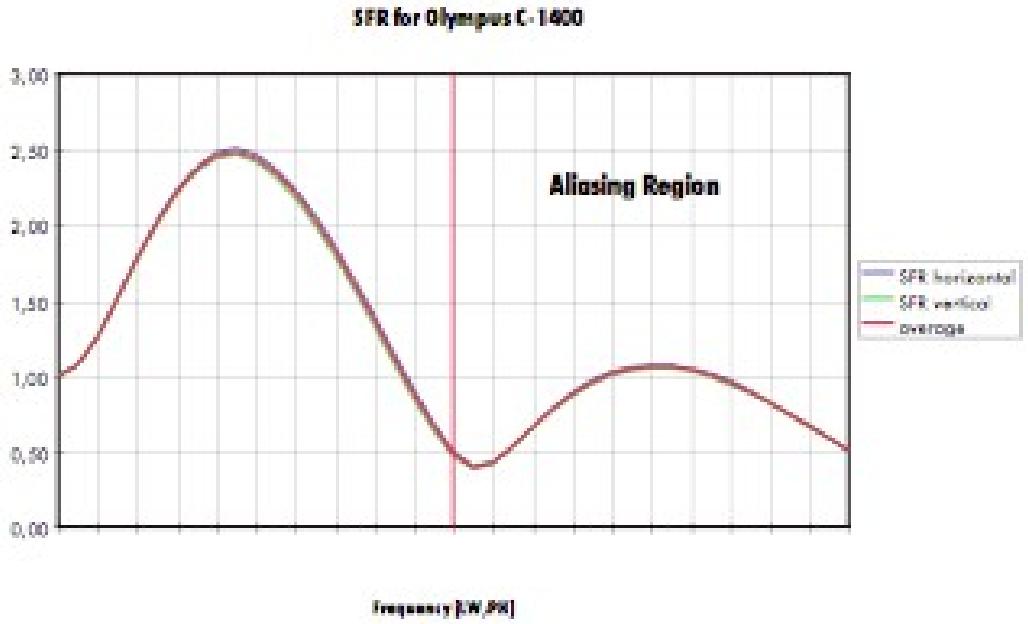
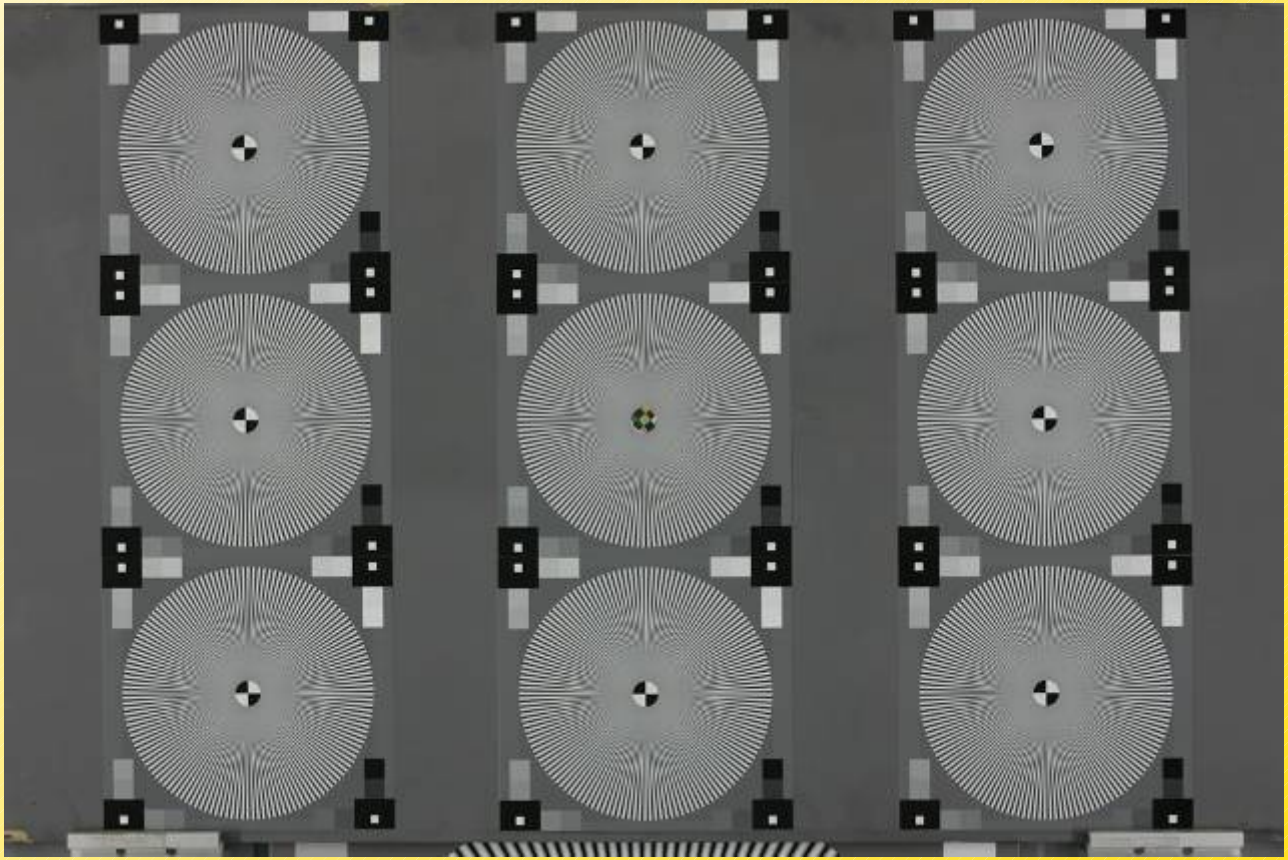


Digital Camera Tests

- resolution measurement



Finding new methods

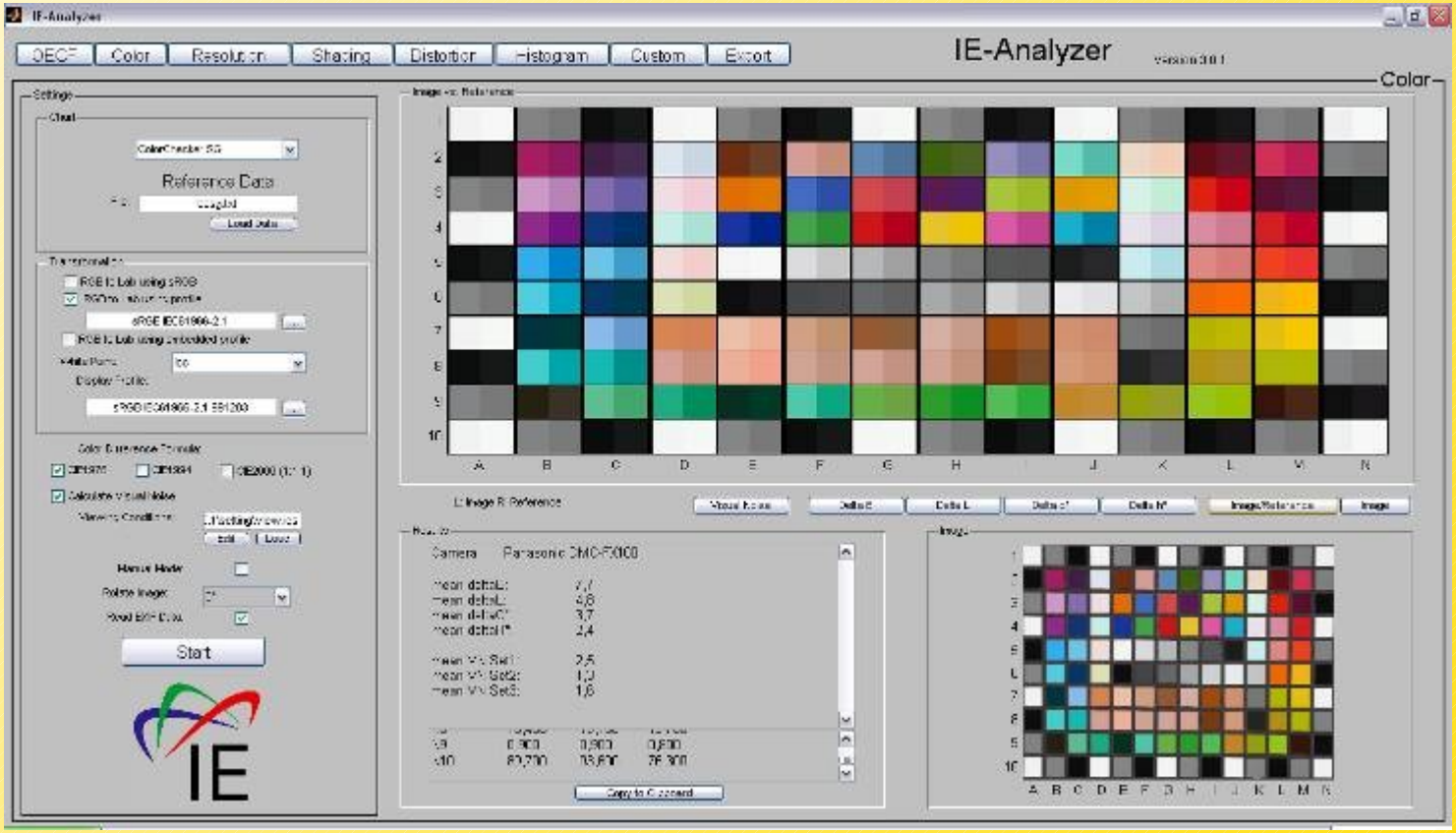
- Signal to noise vs. Visual noise

SNx= 27

SNx= 29

Digital Camera Tests

- color reproduction quality



Digital Camera Tests

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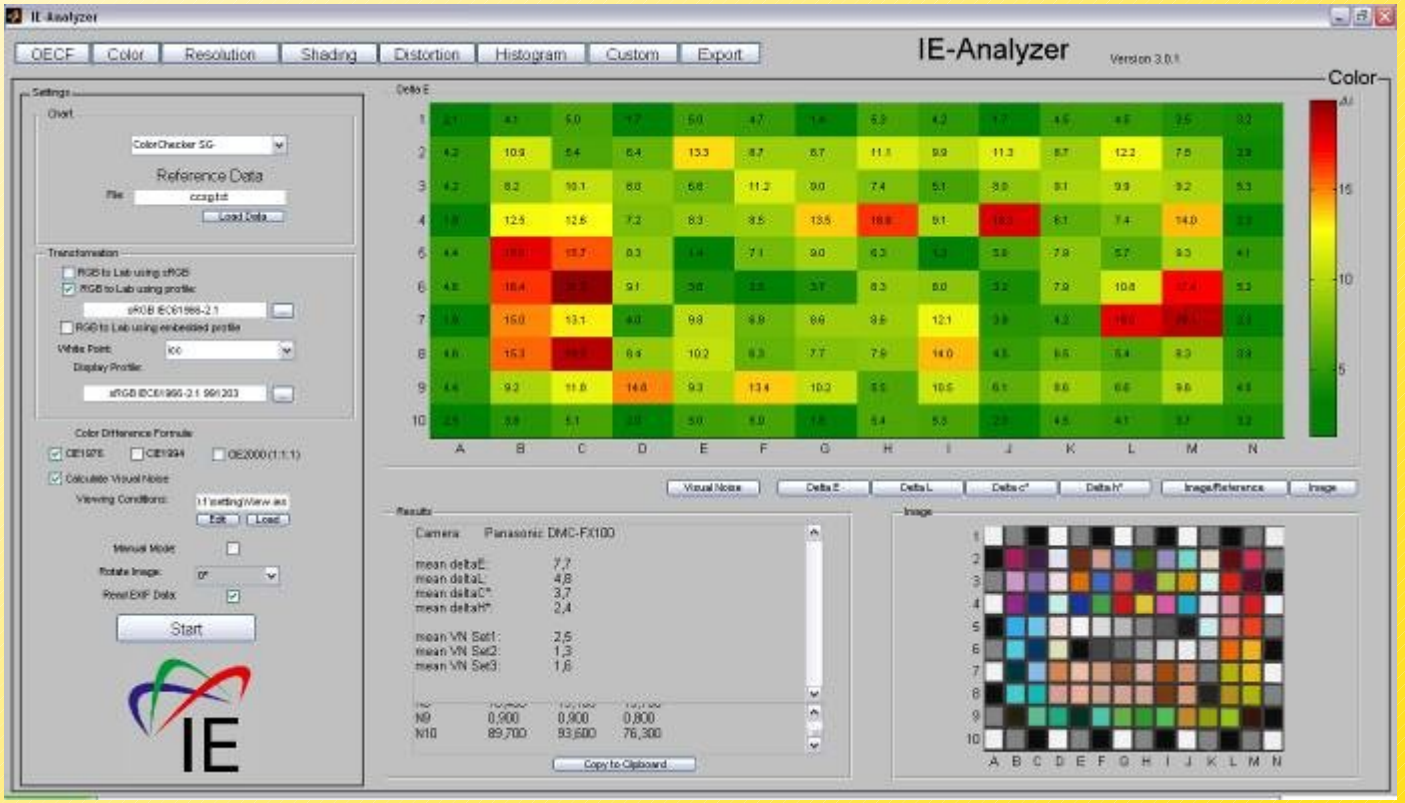

Digital Camera Tests

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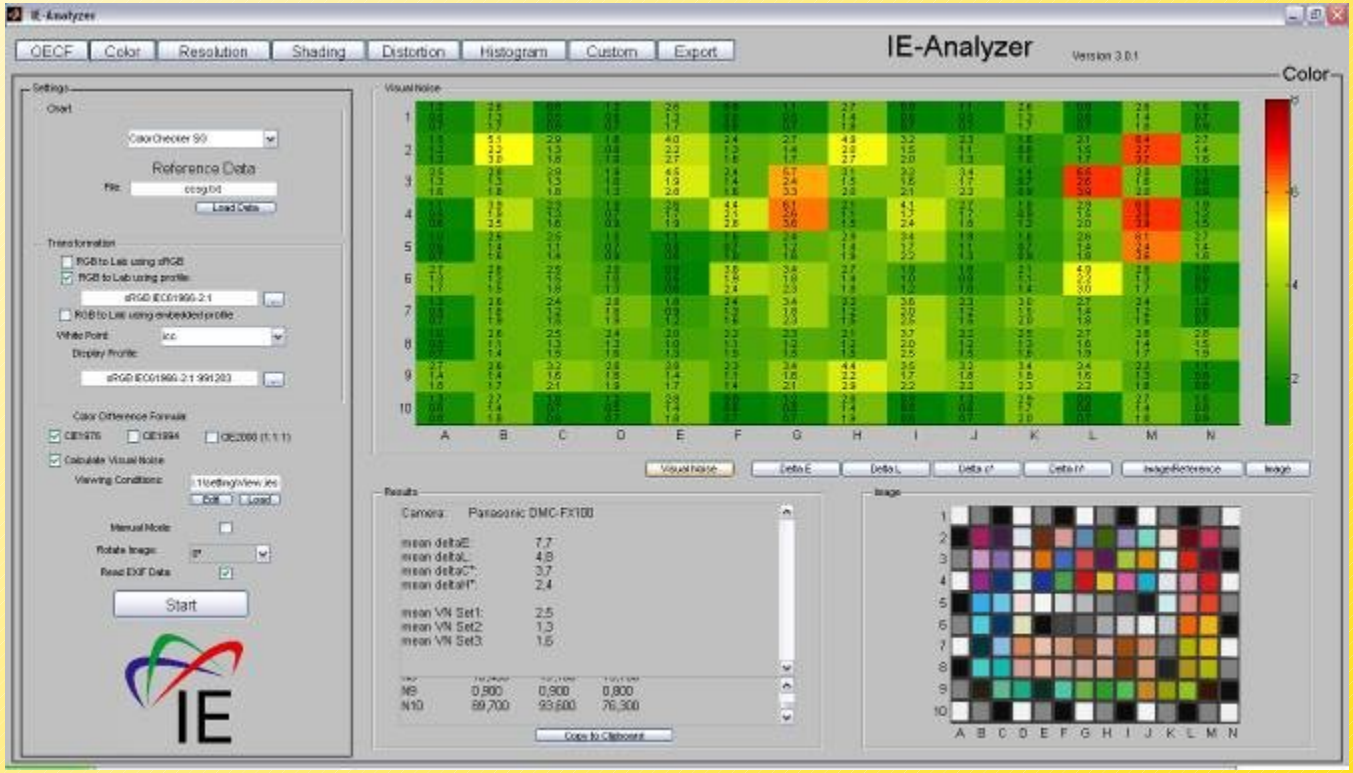
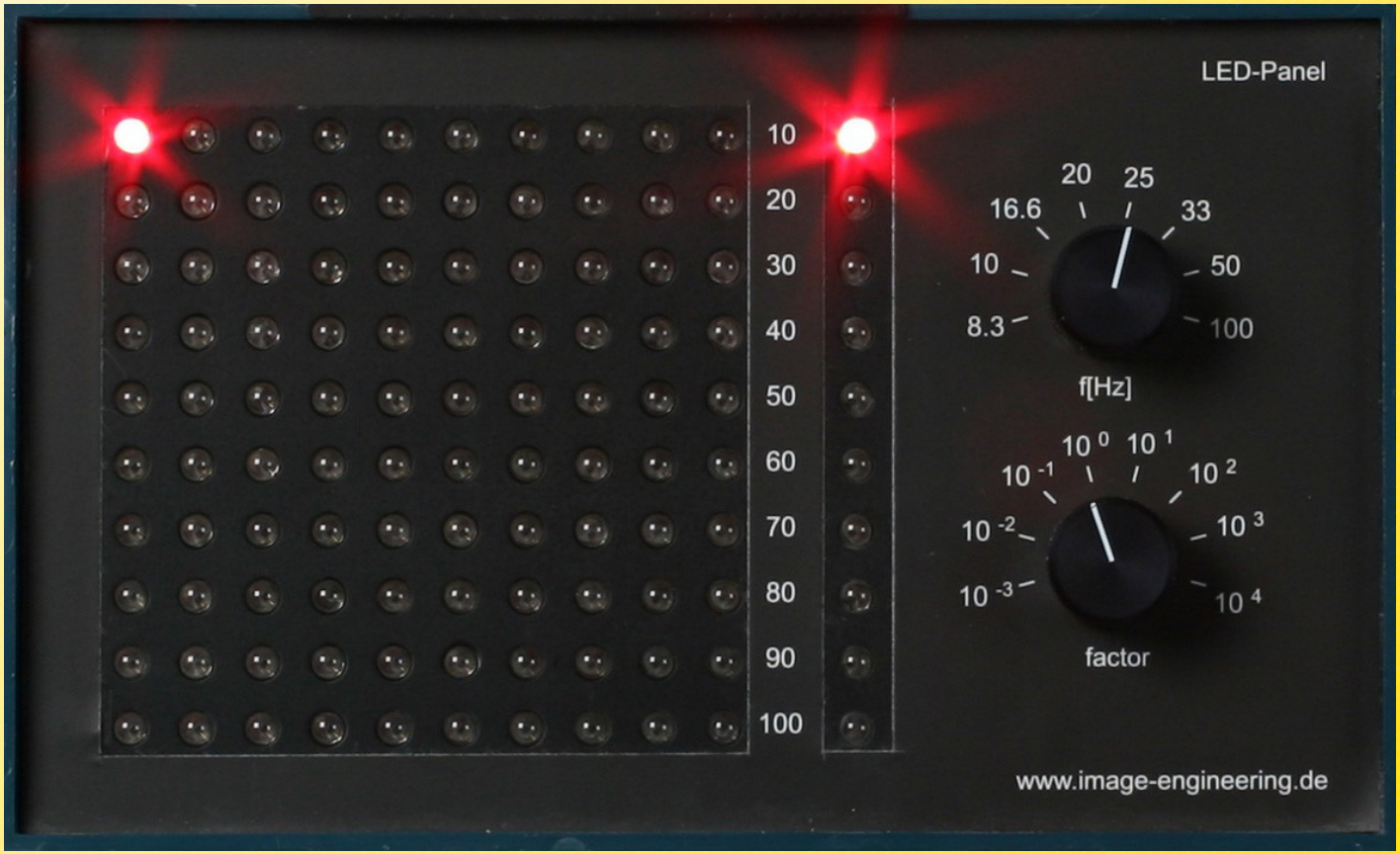


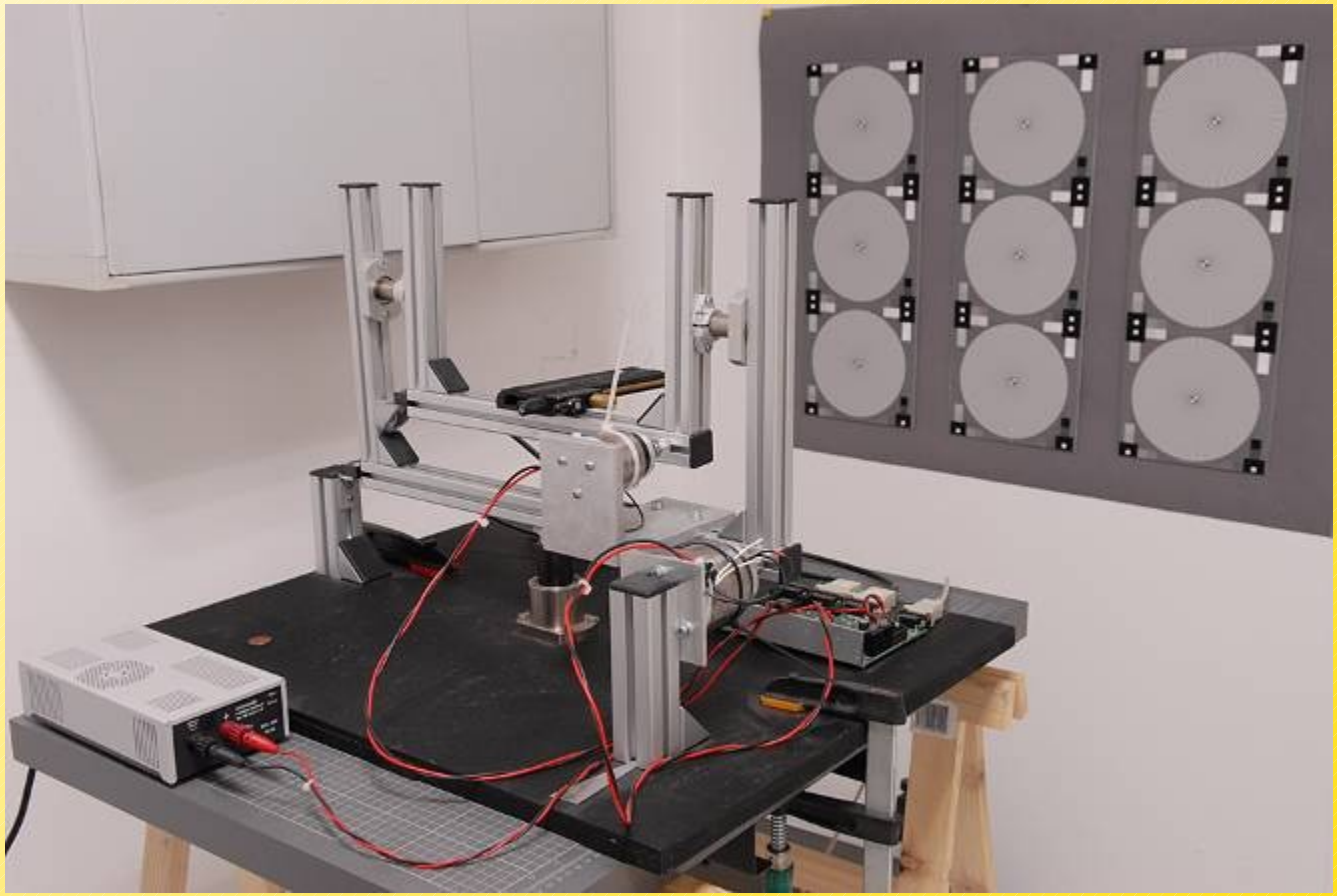
Digital Camera Tests

- shutter and shooting lag

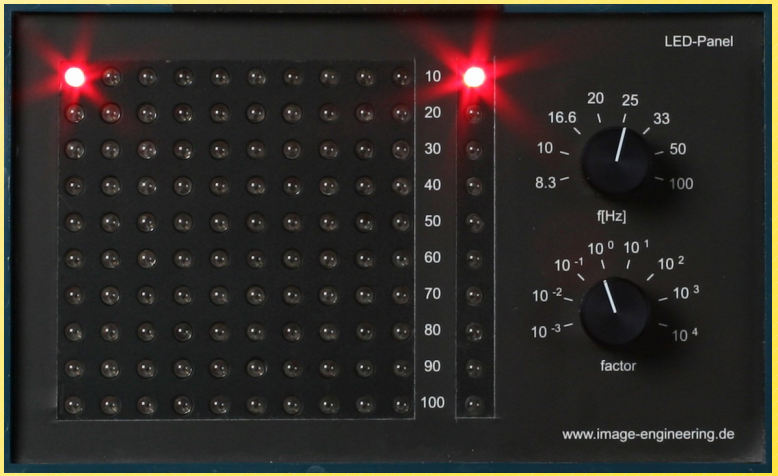


Digital Camera Tests

- Welcome: Steve (“Stabilizer Evaluation Equipment”)

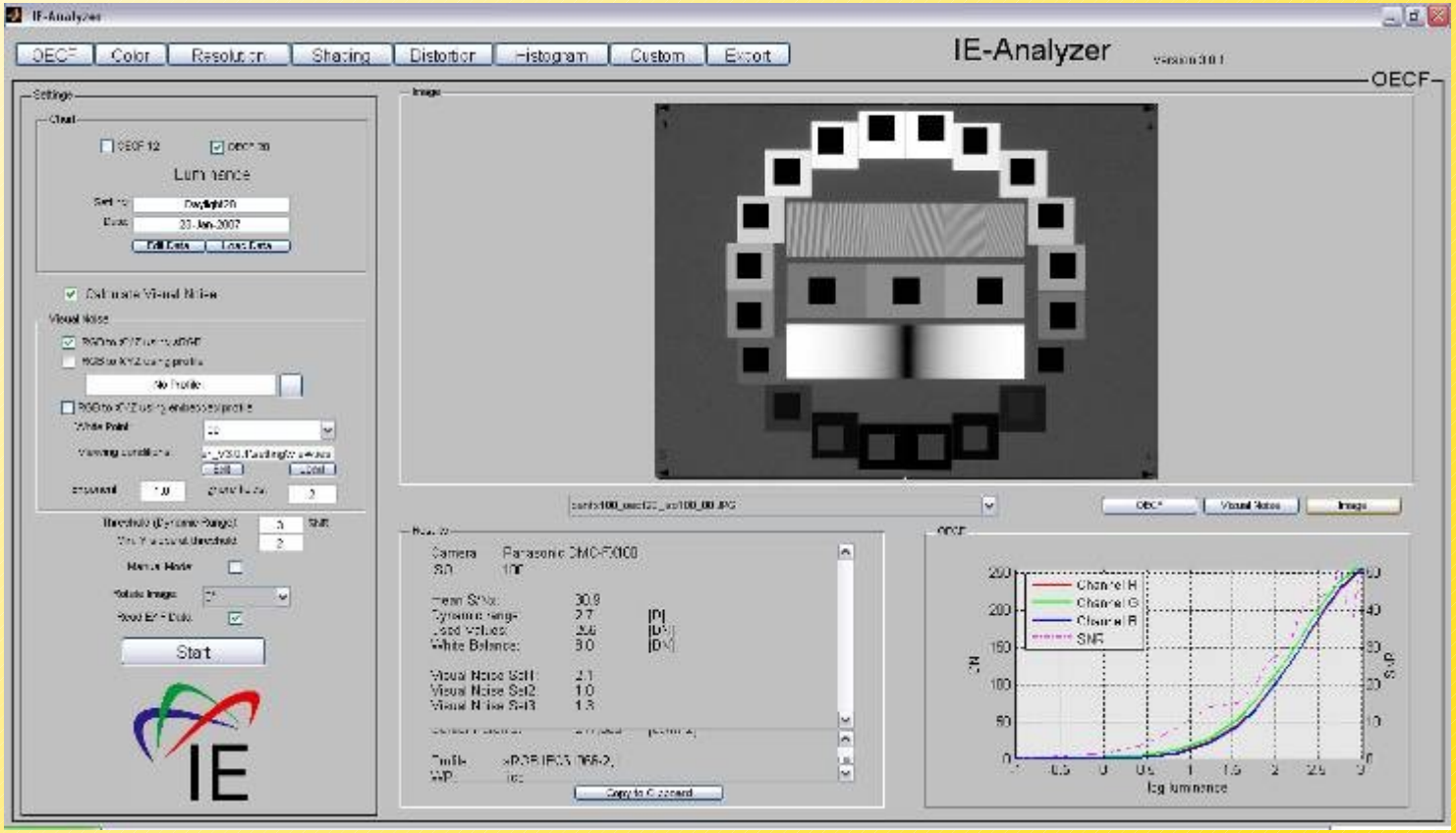


Digital Camera Tests



Digital Camera Tests

- OECF, Speed, and Noise (ISO 14524, 15739)



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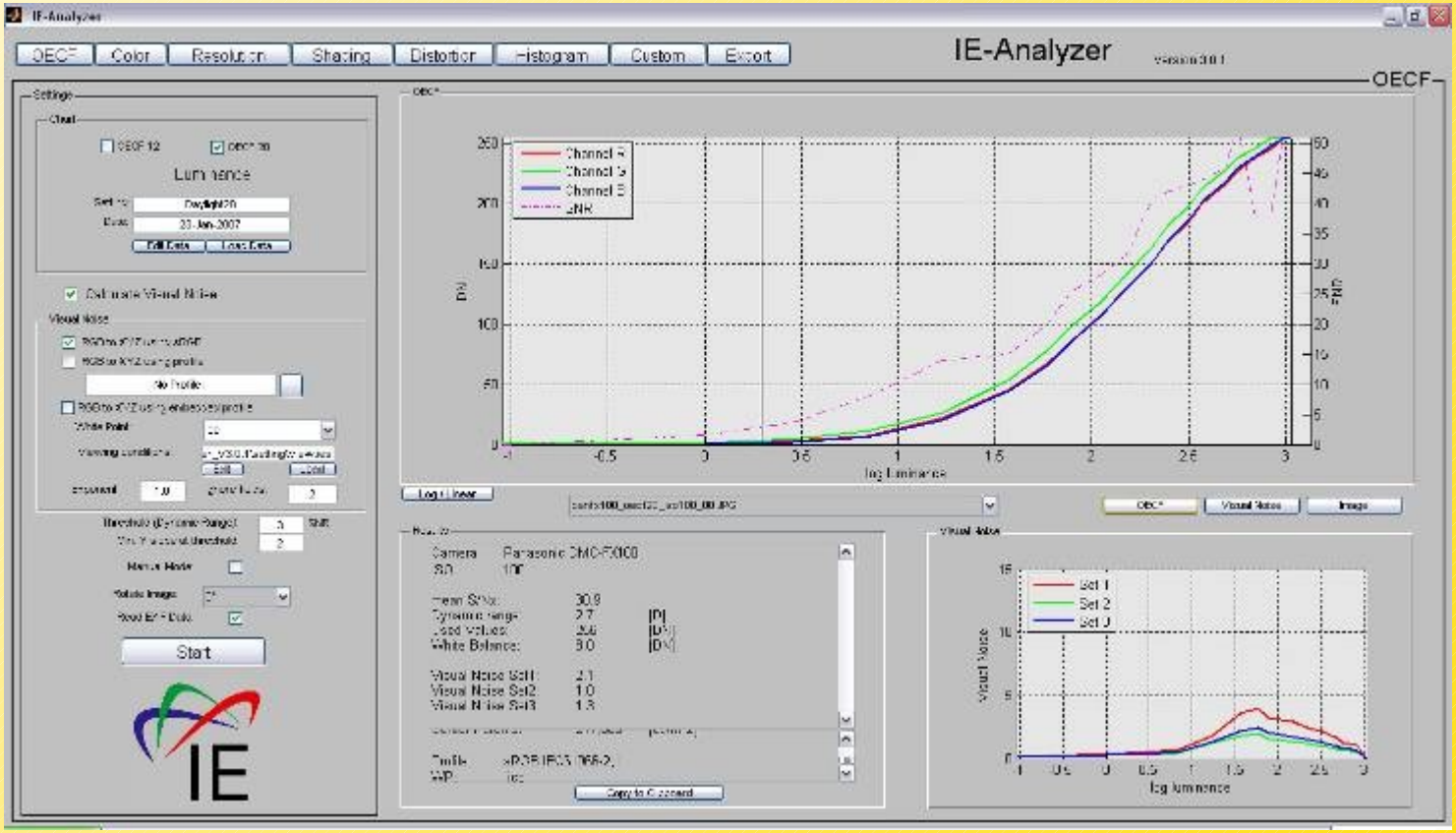
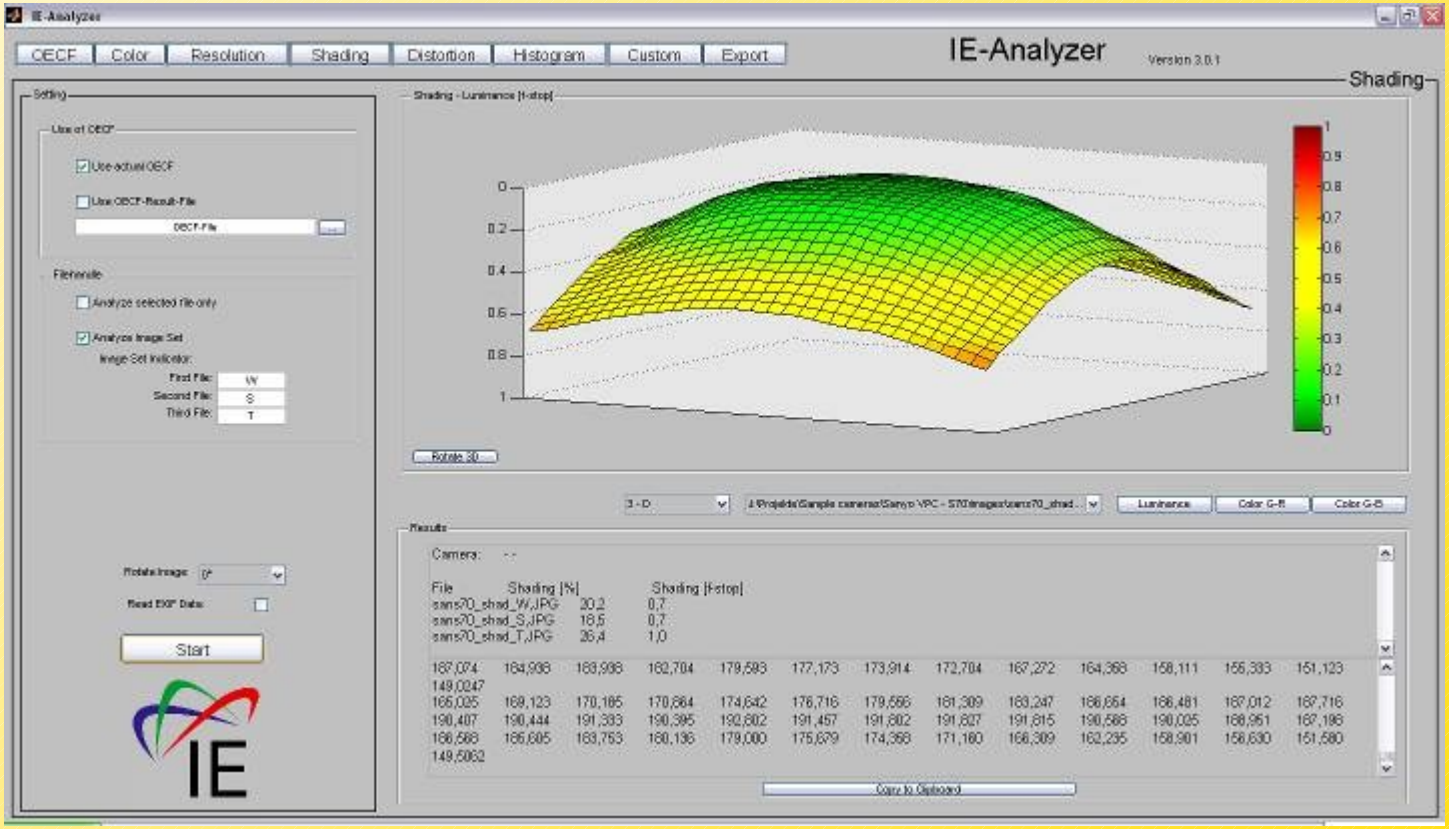


Digital Camera Tests

- vignetting / corner shading



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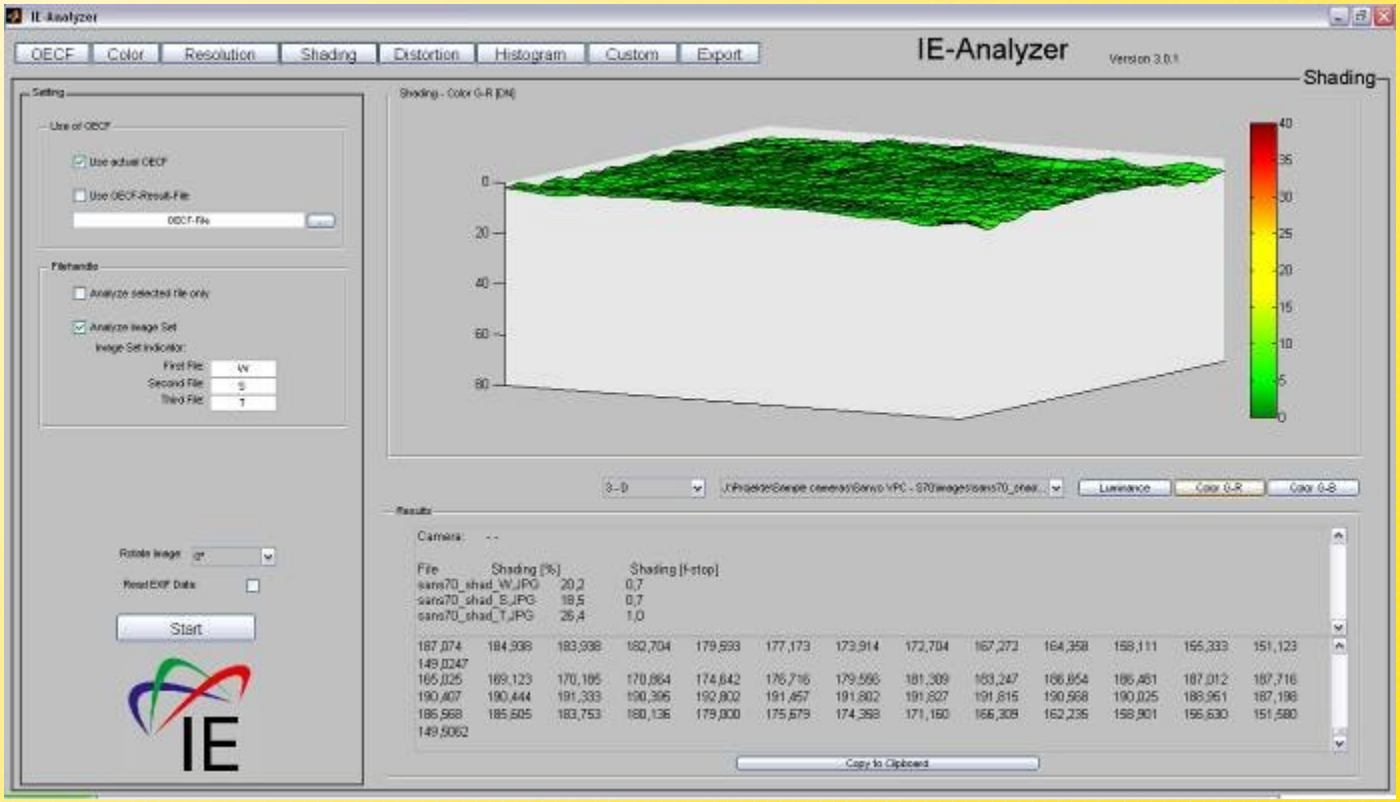
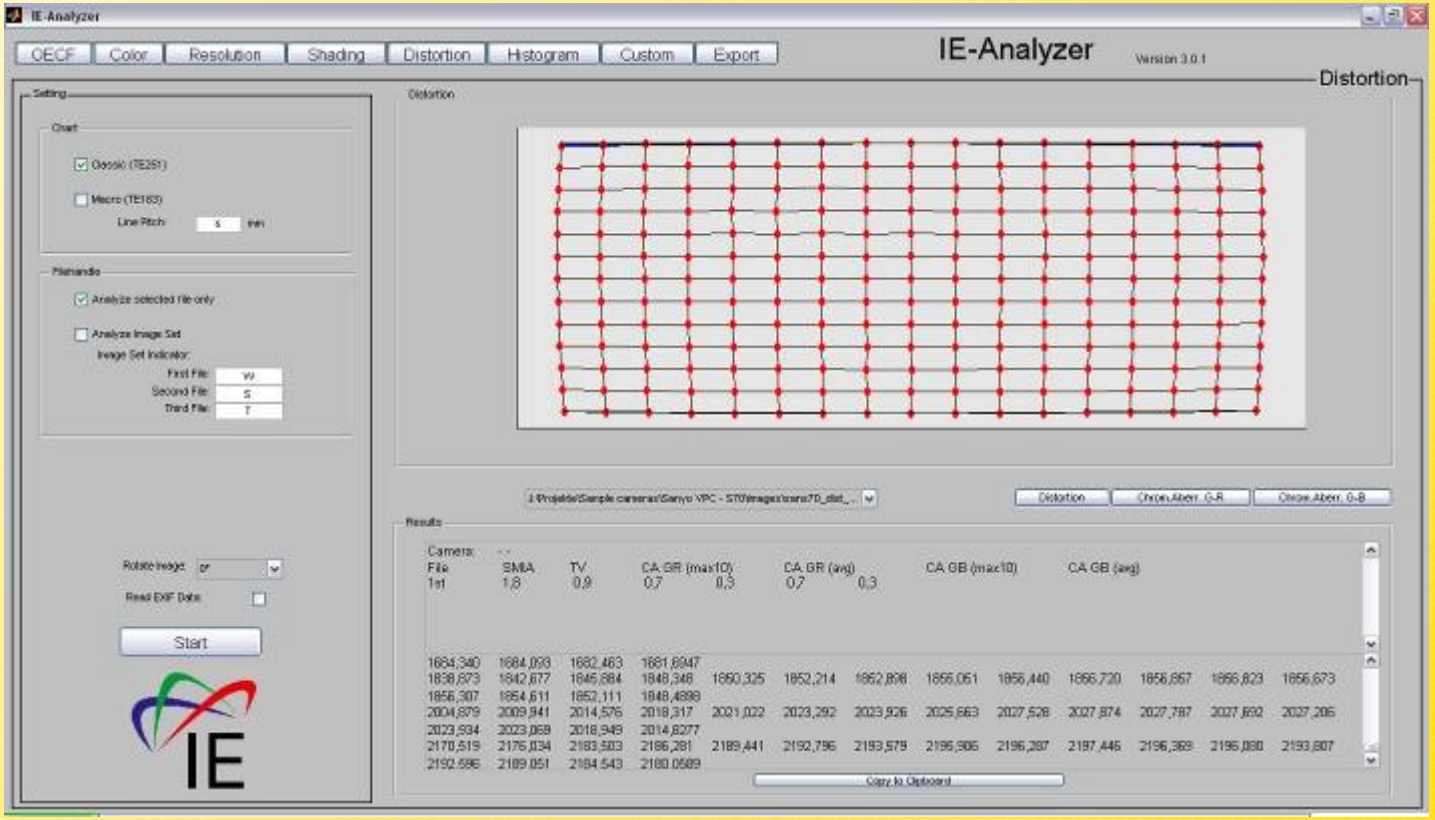


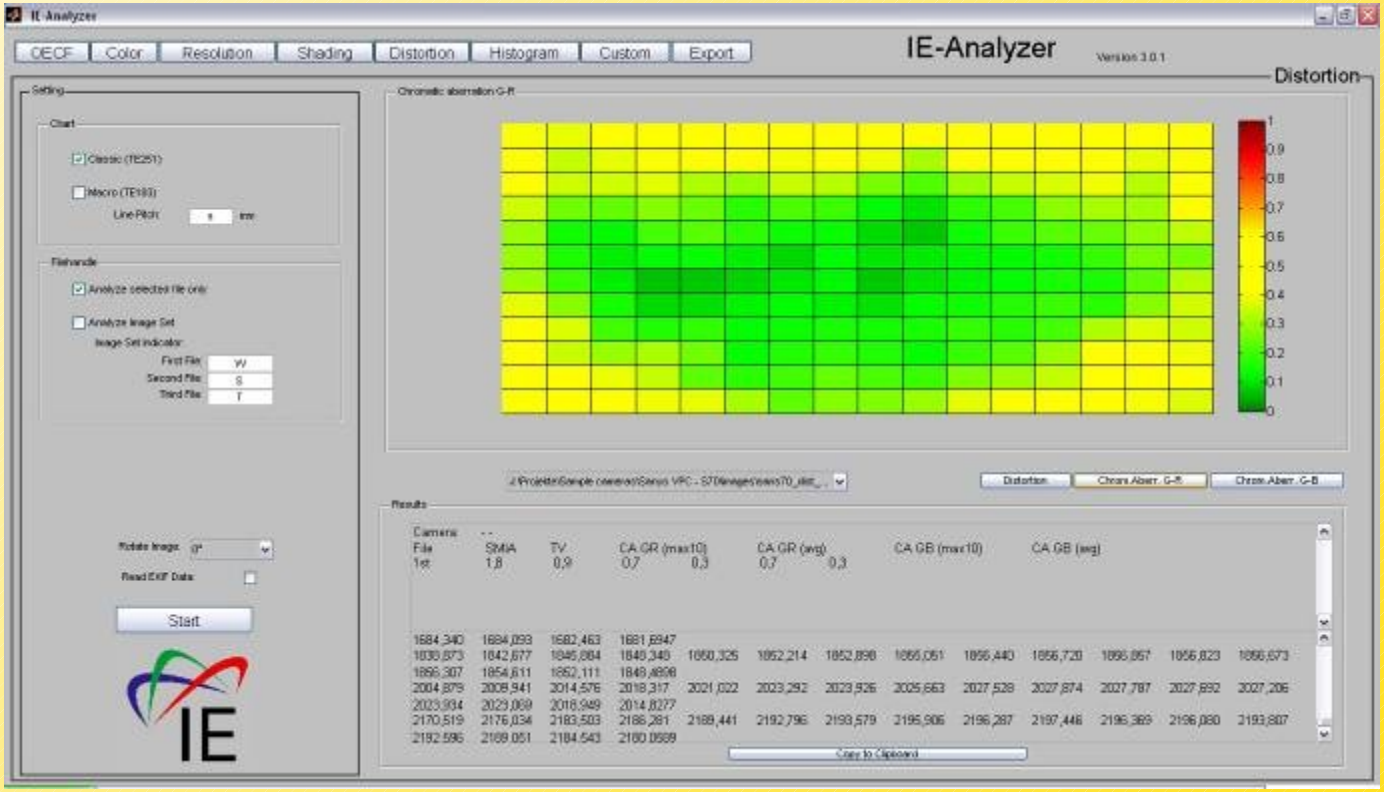
Digital Camera Tests

- distortion



Digital Camera Tests

- chromatic aberration

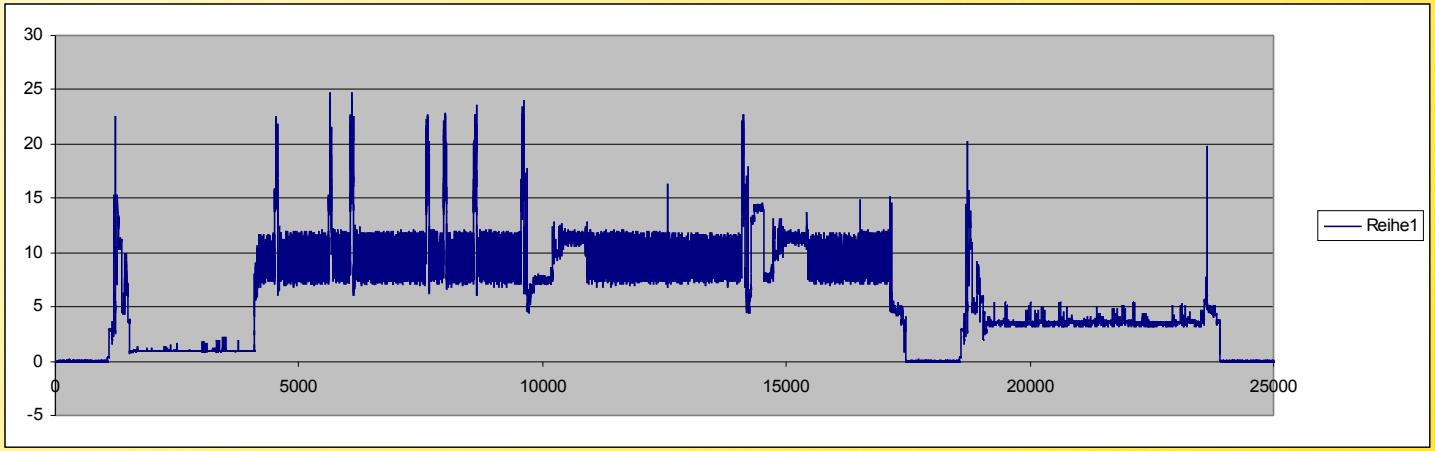


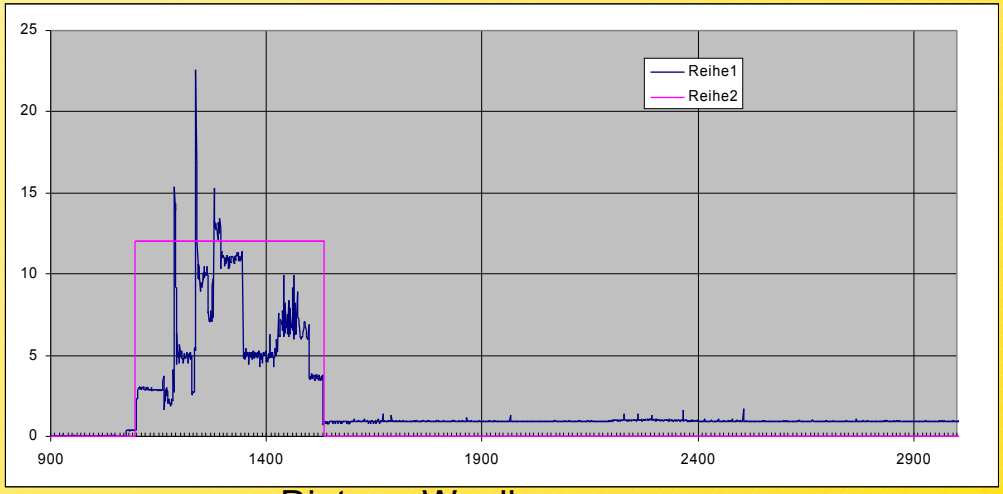
Digital Camera Tests

- power consumption test

Digital Camera Tests

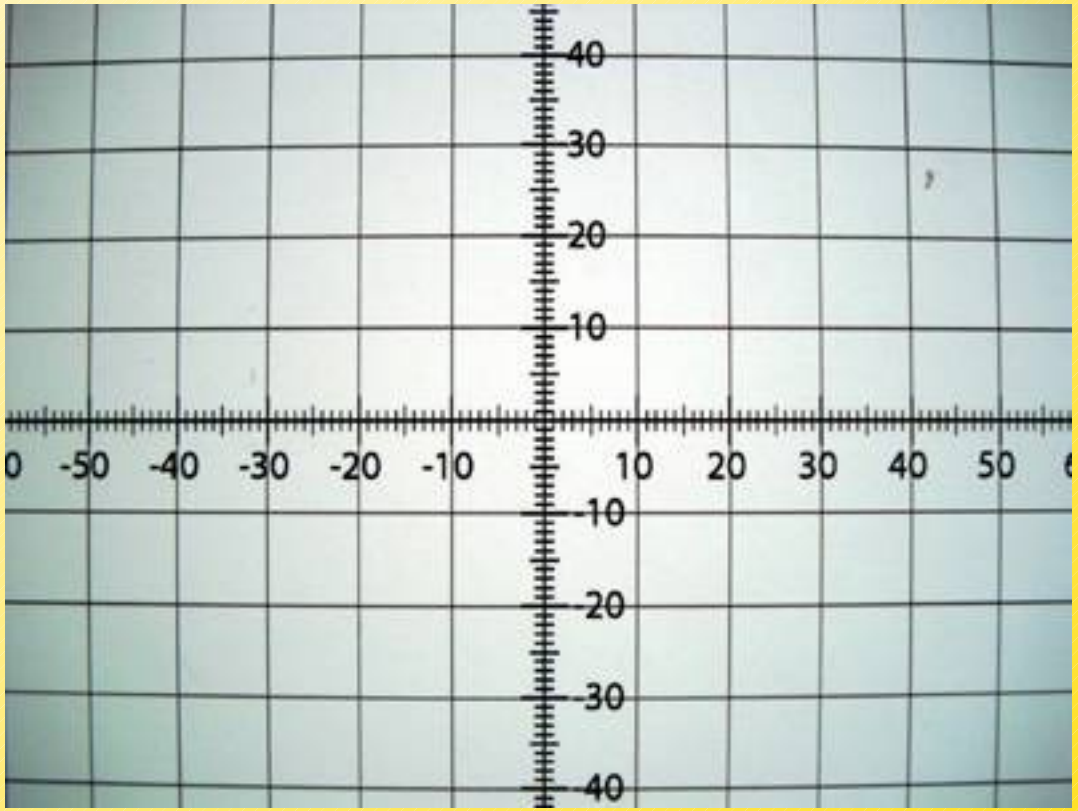
- power consumption and shooting rate





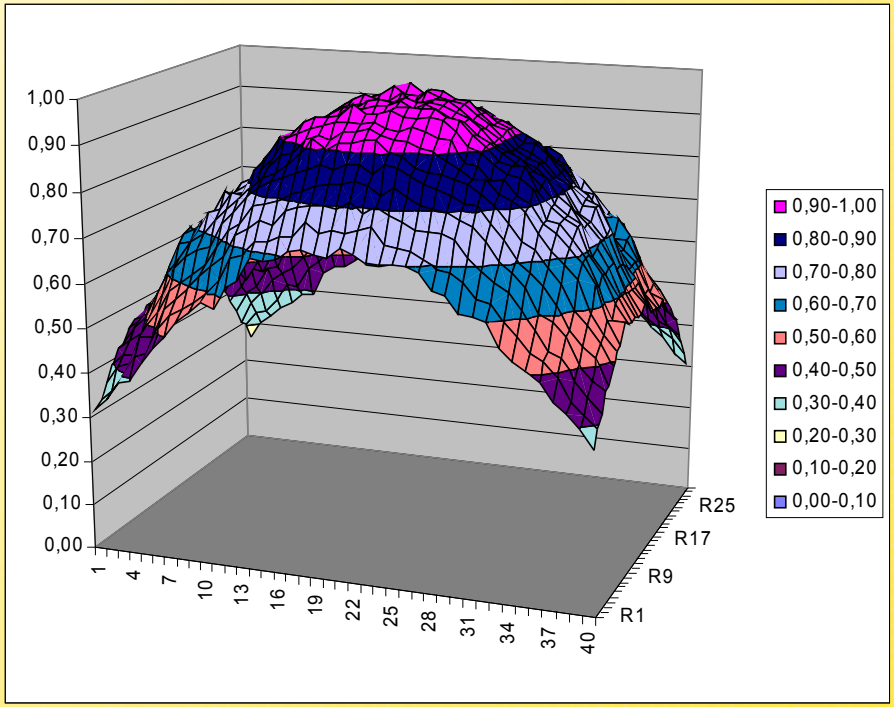
Digital Camera Tests

- max. scale



Digital Camera Tests

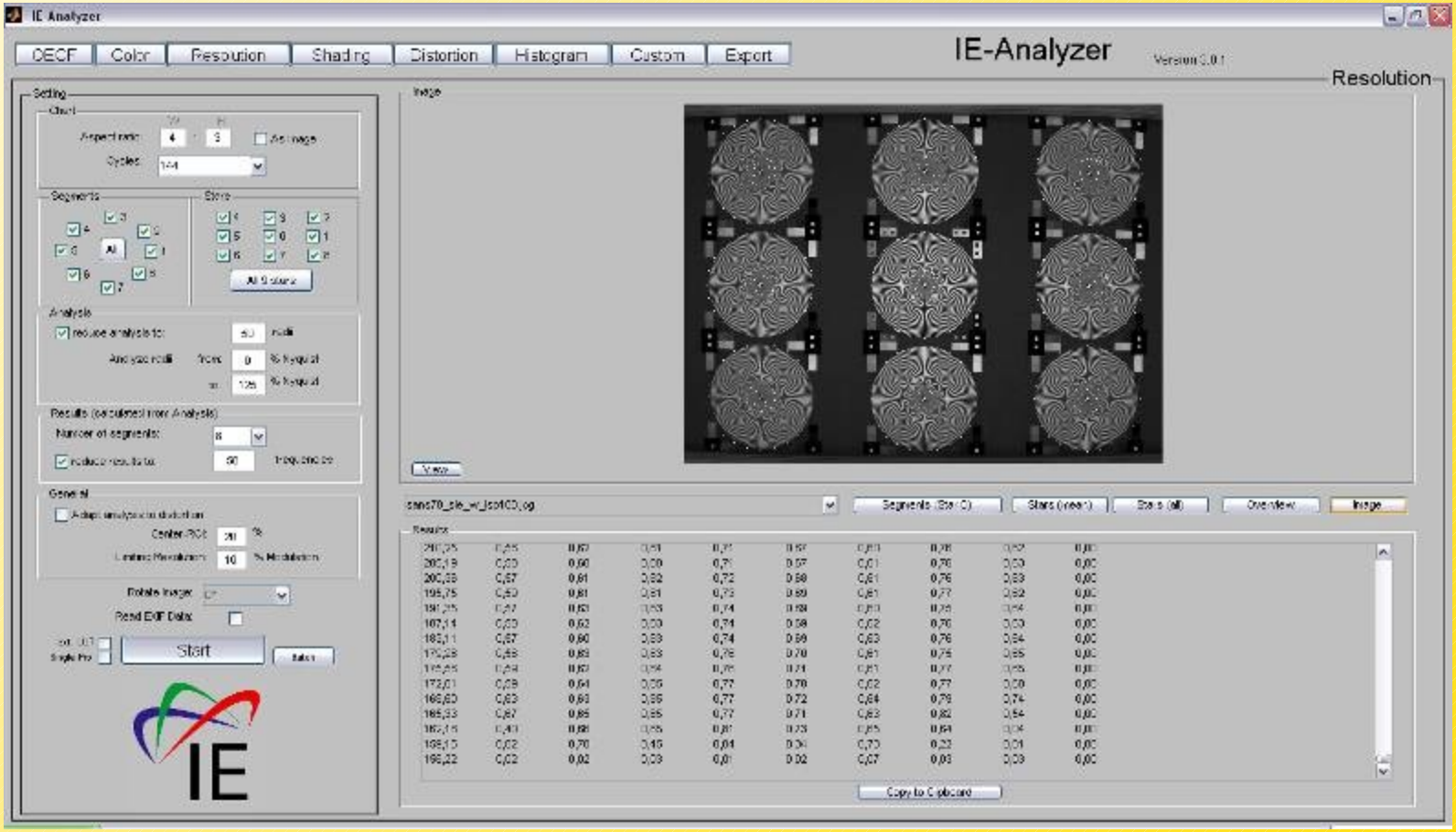
- Flash: uniformity and guide number



Zeile	Log Luminanz	y	Log Luminanz
3	0,67	11	1,08
4	1,46	42	
5	1,92	93	1,97
6	2,16	132	
Differenz Blendenstufen			2,97

Digital Camera Tests

- resolution measurement



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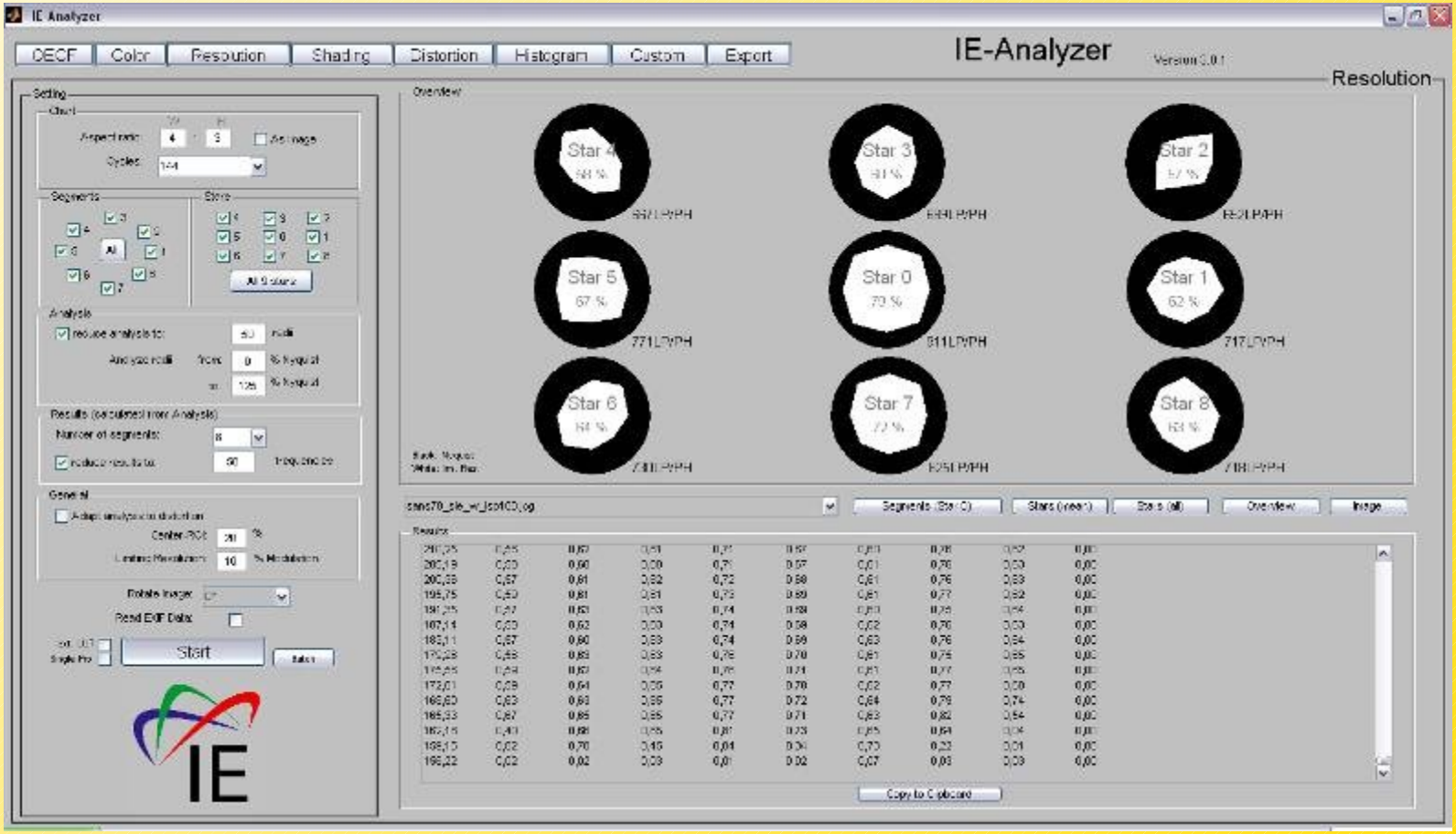

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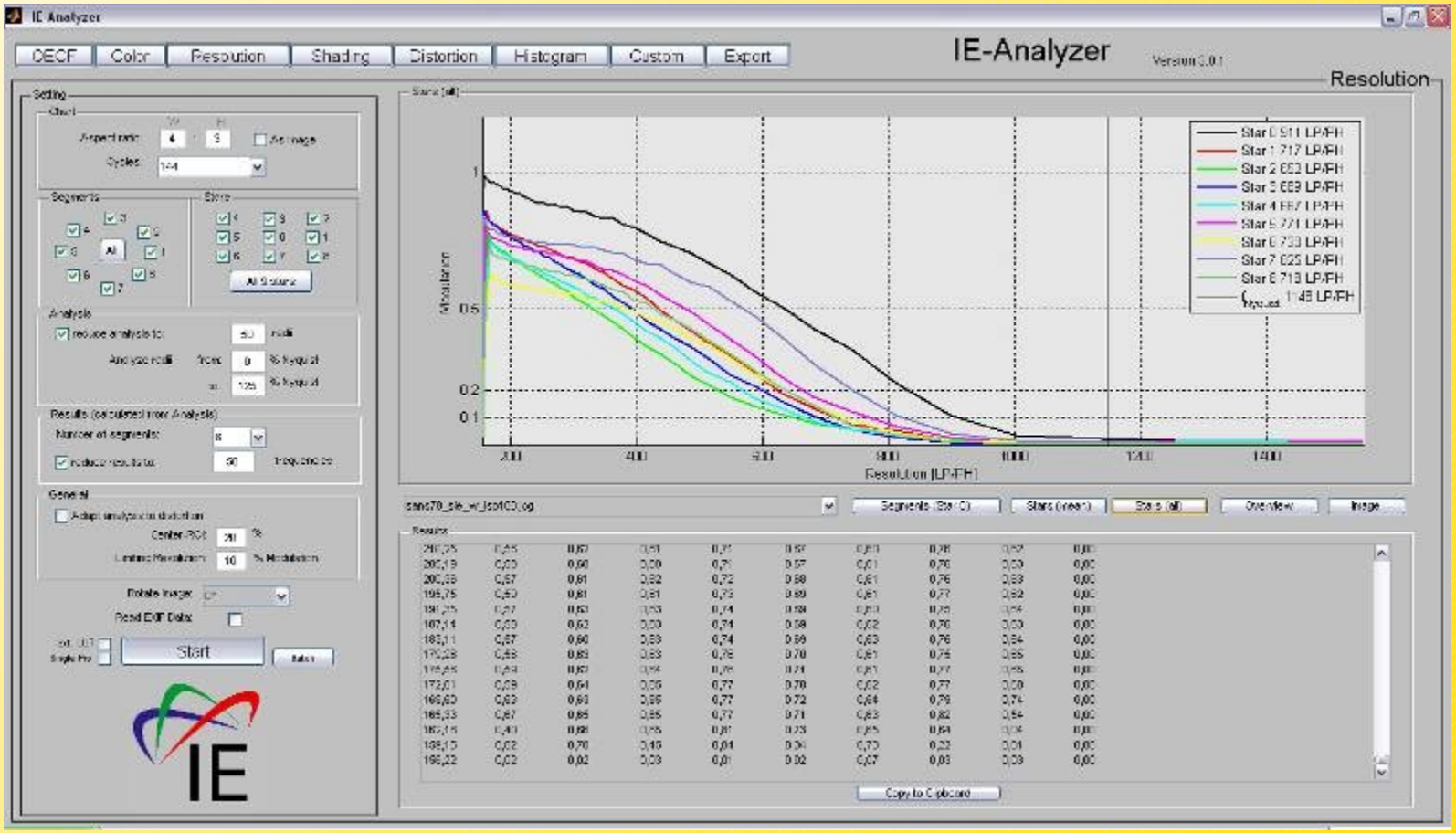

Digital Camera Tests

- Measuring spectral sensitivities

Digital Camera Tests

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