FLUORESCENCE and PHOSPHORESCENCE
Quality Control in the printing industry

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Luminescence Terminology

- In Fluorescence a substance‘s glow is triggered by (UV) light. The substance absorbs light and emits light of a longer wavelength while the light source is on.

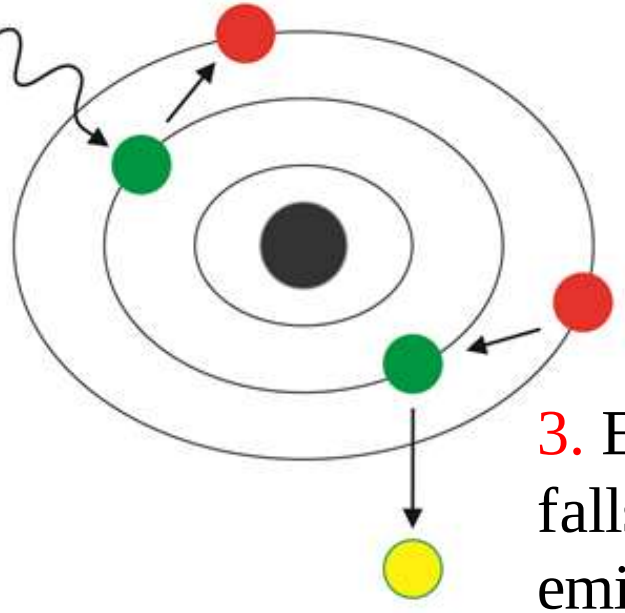
- In Phosphorescence a substance‘s glow is triggered by (UV) light. The substance absorbs light and emits light of a longer wavelength and continues after the light source has been switched off.

- Other Luminescence types are triggered by a chemical reaction, electricity, X-rays, sound, temperature, mechanical impact.

Luminescence

1. Excitation energy from photon of a short wavelength

2. Electron is raised to a higher energy level



3. Electron spontaneously falls to lower energy, emitting photons of longer wavelength

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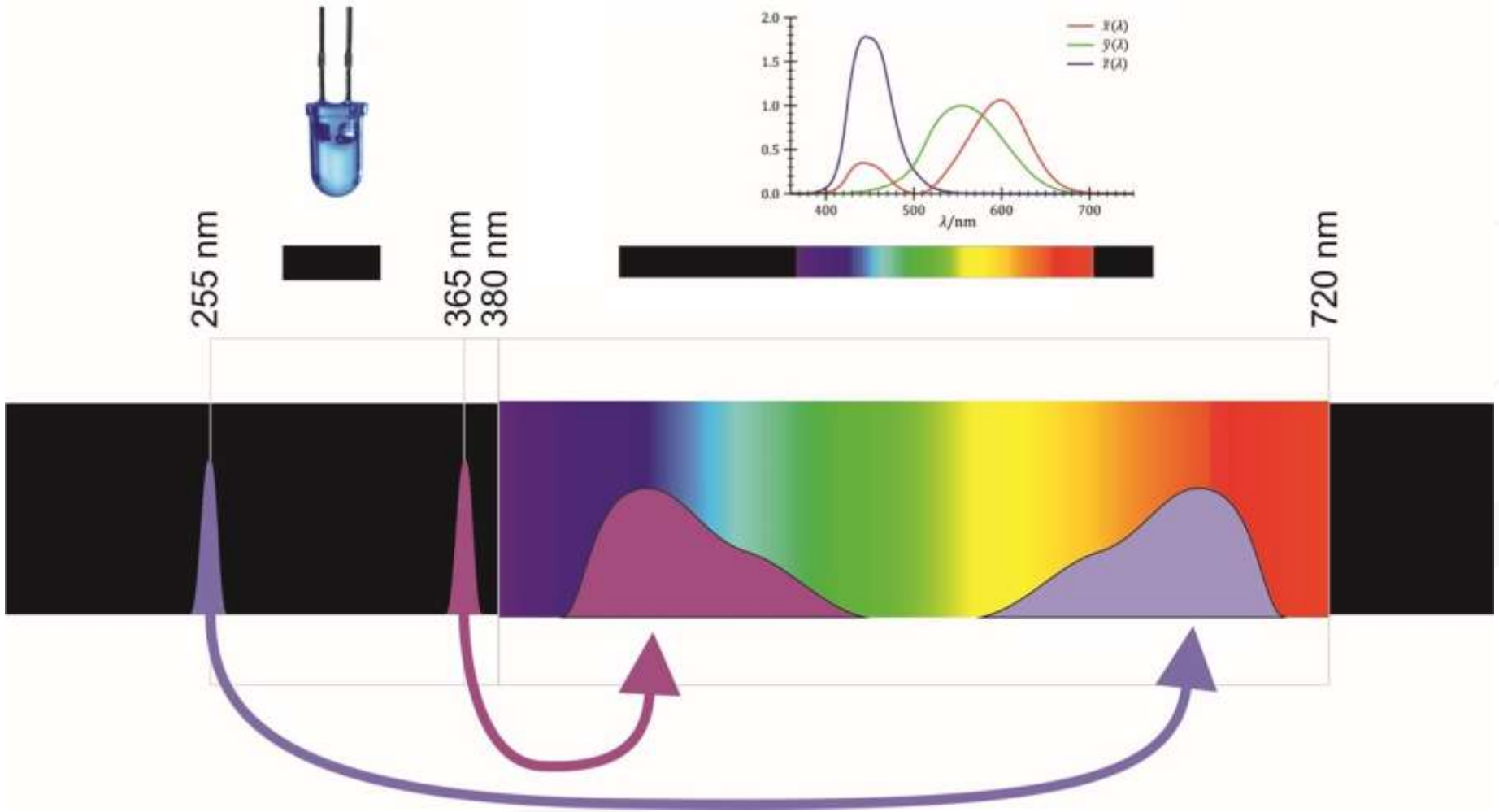
Fluorescence and Phosphorescence



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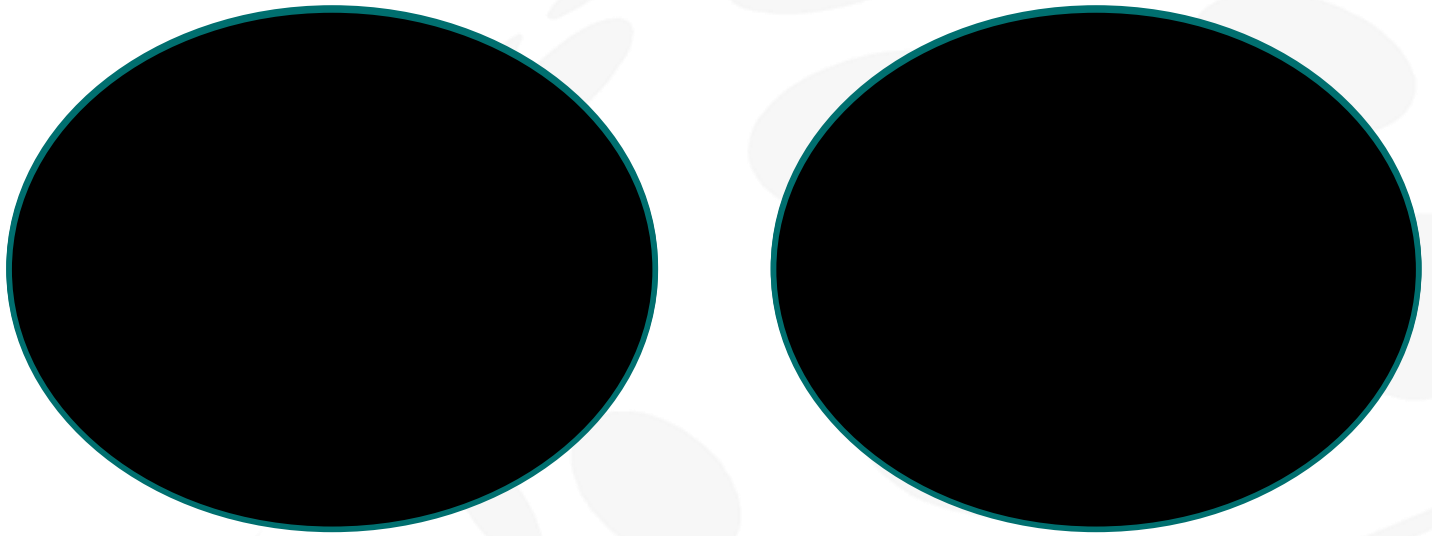
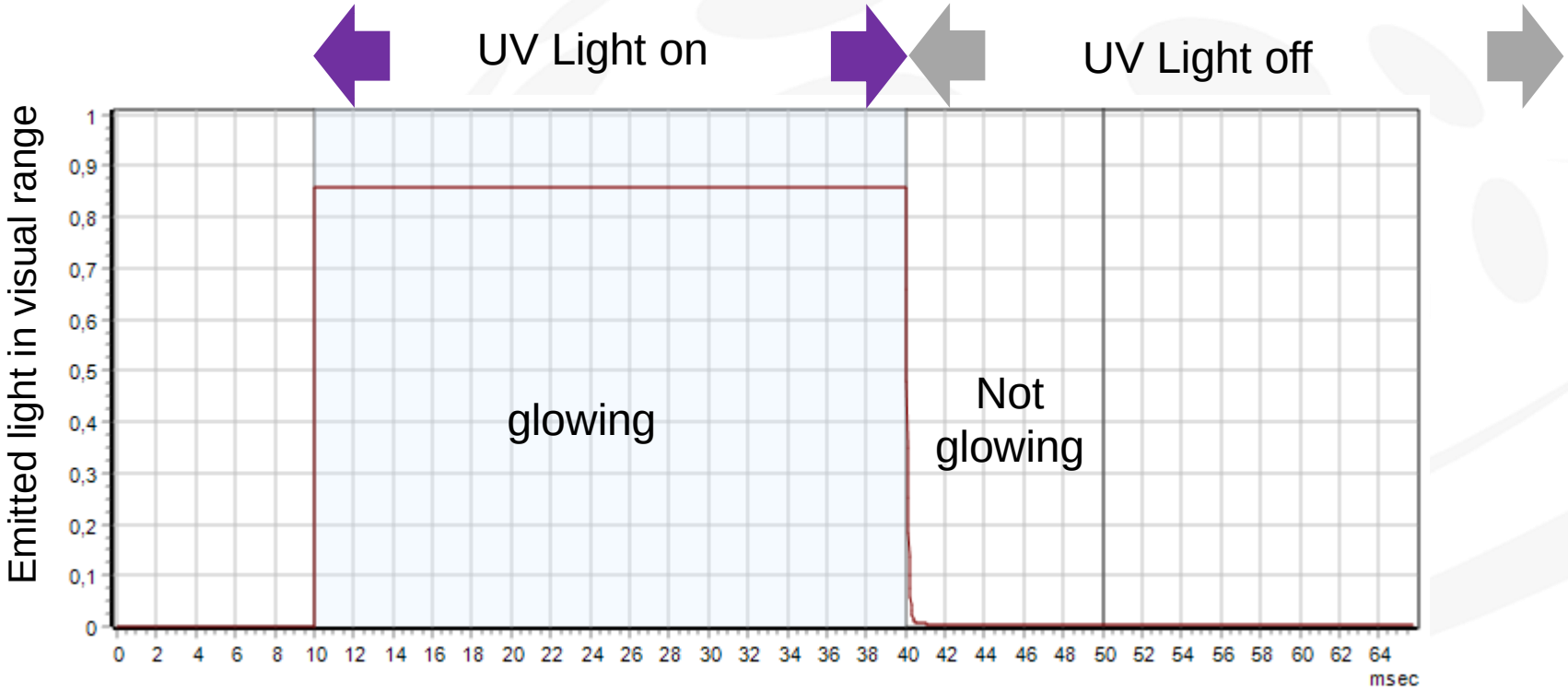
Phosphorescence – an Intensity – Timing scenario

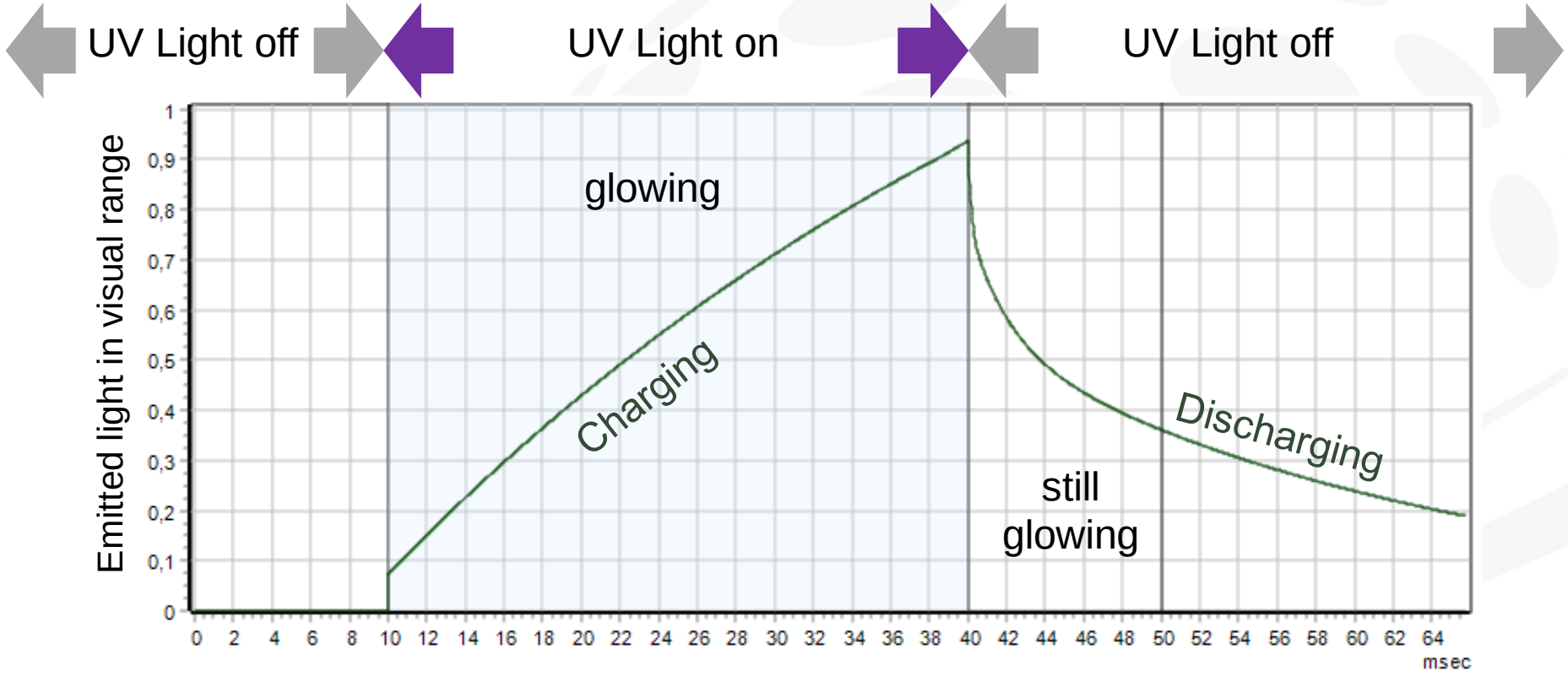


Fluorescence Phosphorescence

Fluorescence light emission



Phosphorescence light emission



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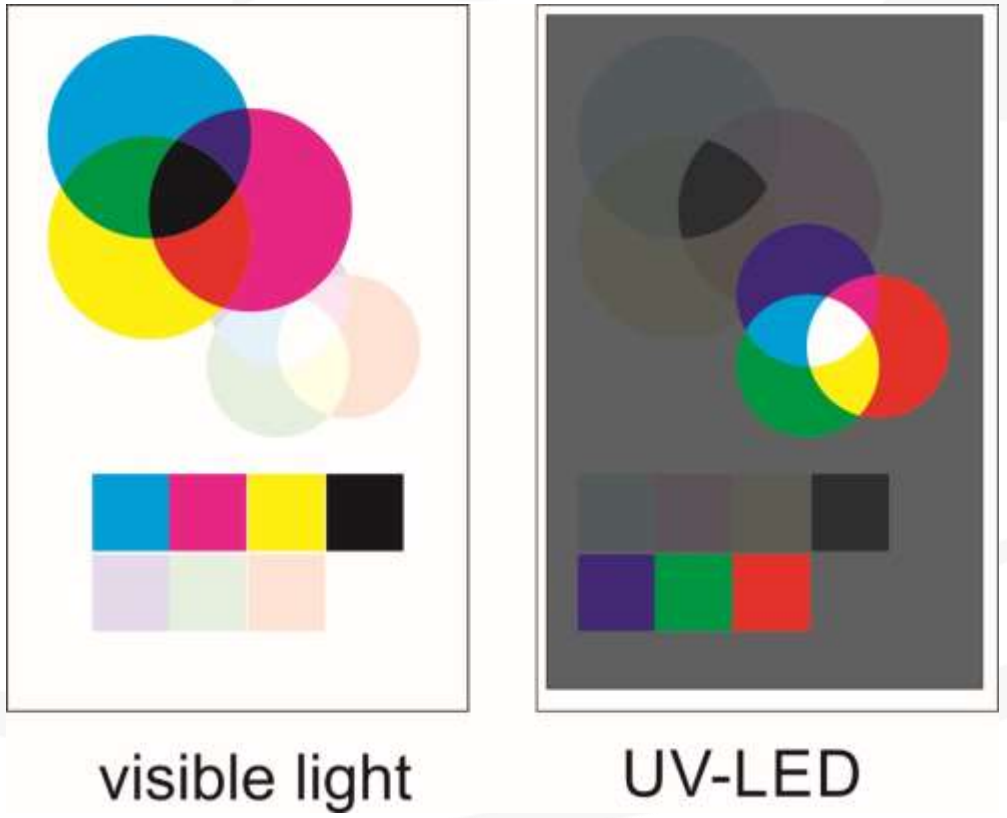
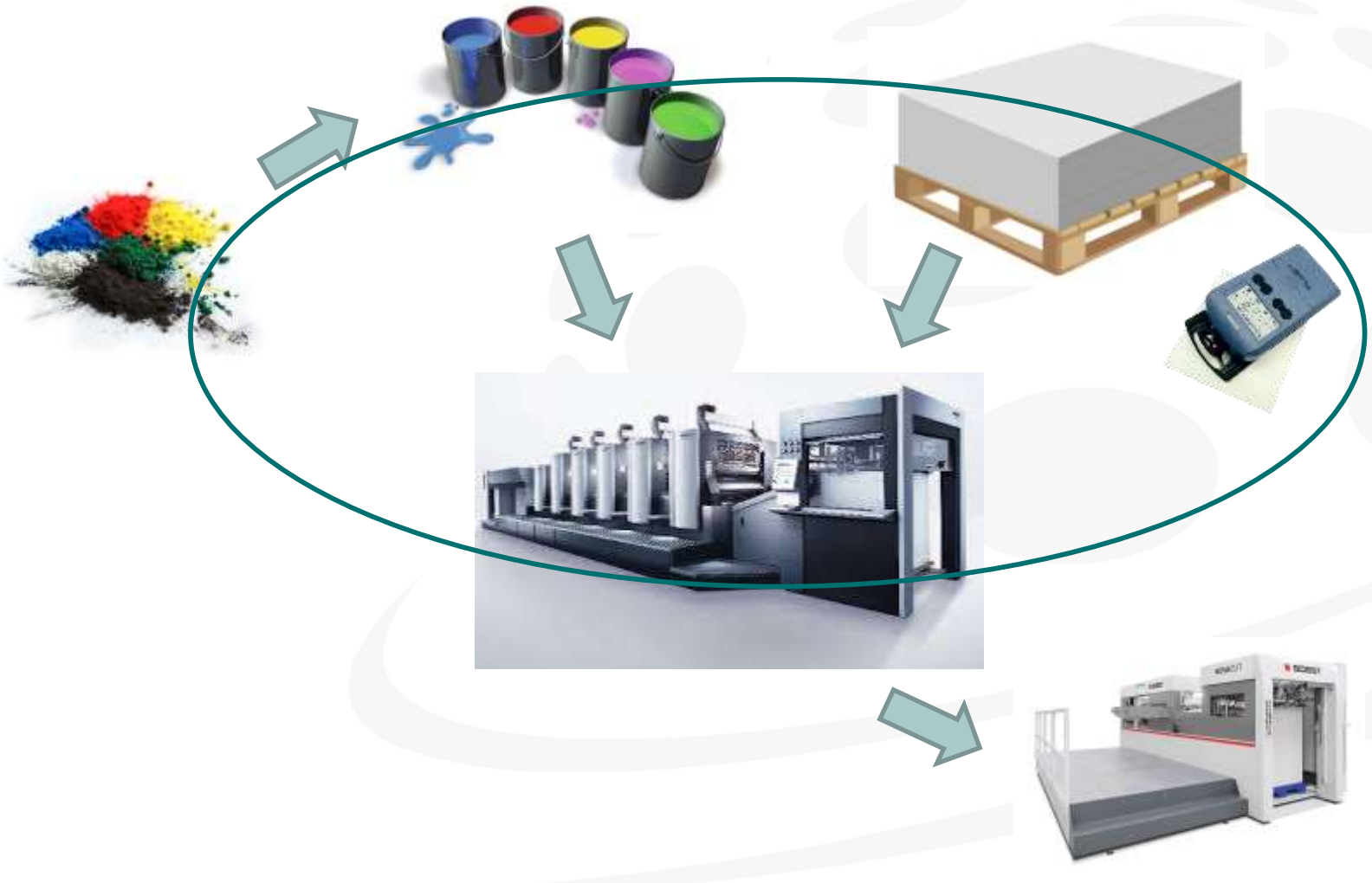
Design a fluorescence sighting feature



Security Elements have to be reproduced within narrow tolerances to be secure



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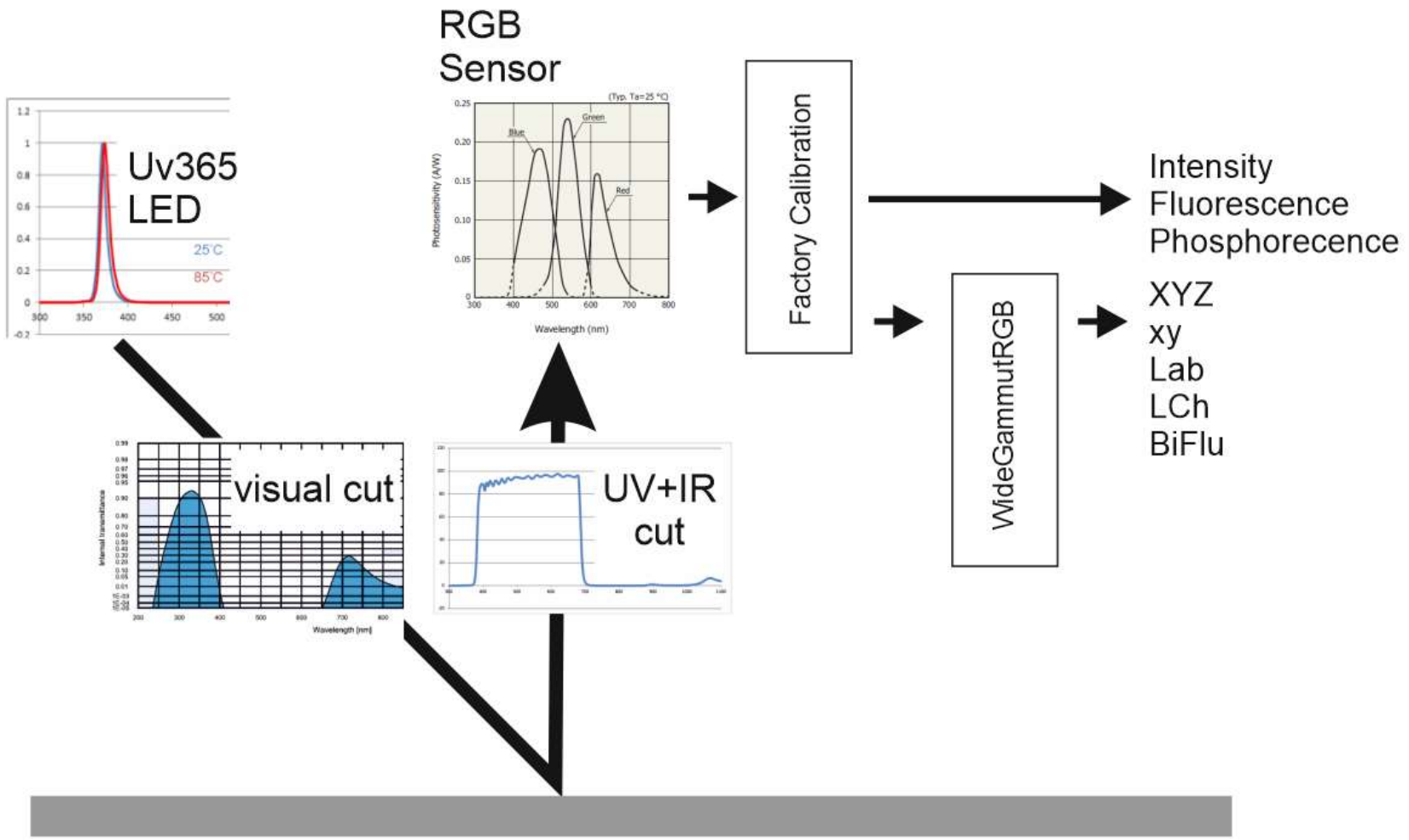
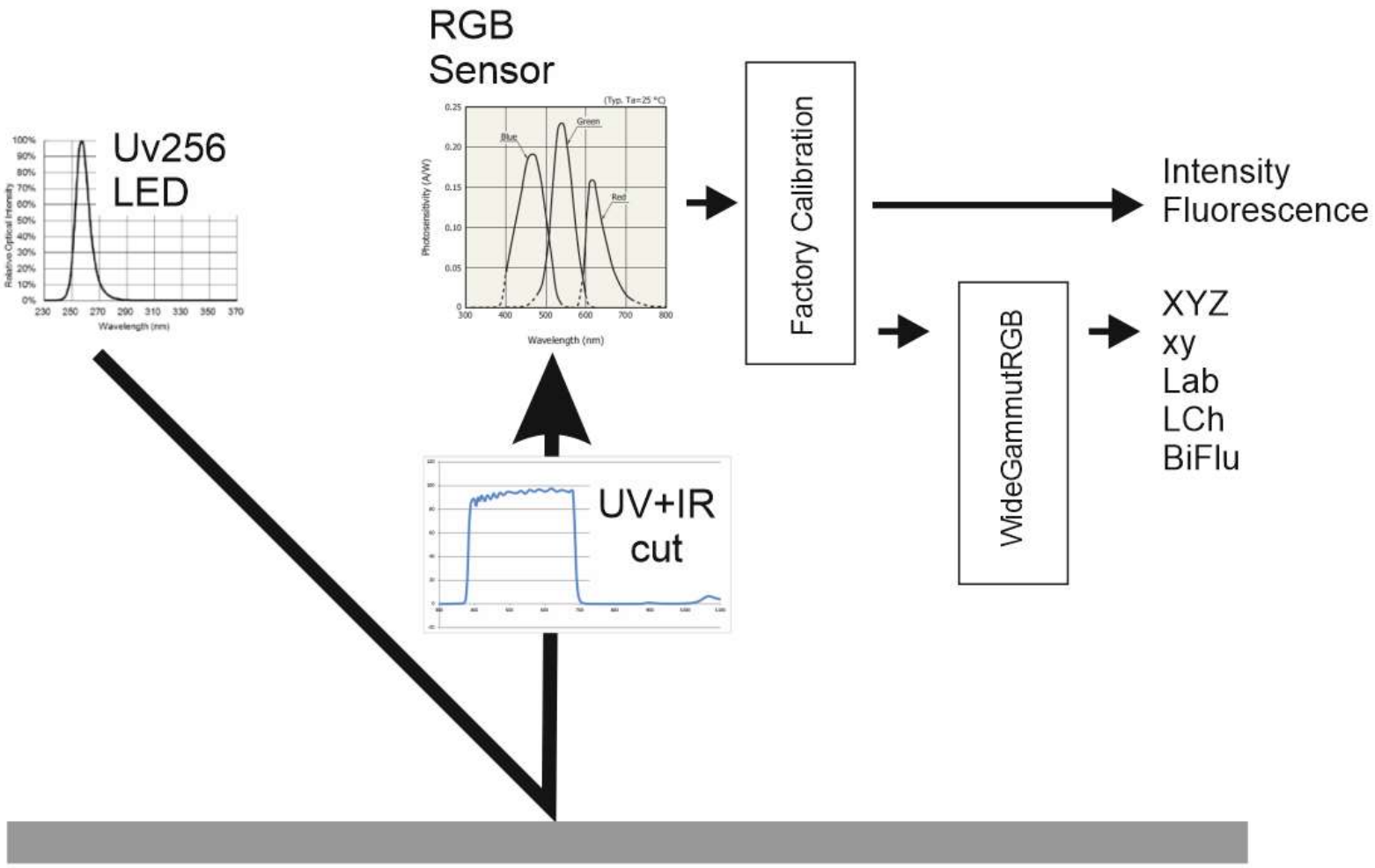
FLUODX Fluorescence and Phosphorescence Colorimeter

- Fluorescent intensity production quality control
- Phosphorescent production quality control
- Fluorescent color Analysis (XYZ, xy, Lab, LCh, BiFL, Delta E)
- Phosphorescence Analysis

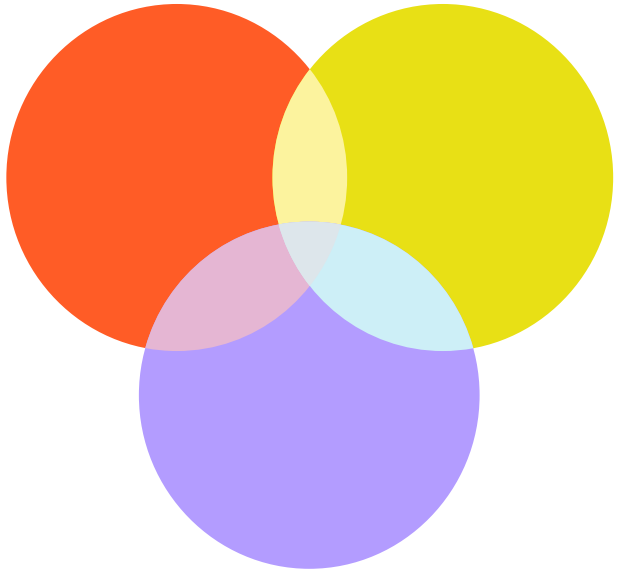
FLUO DX optical system UV 365nm

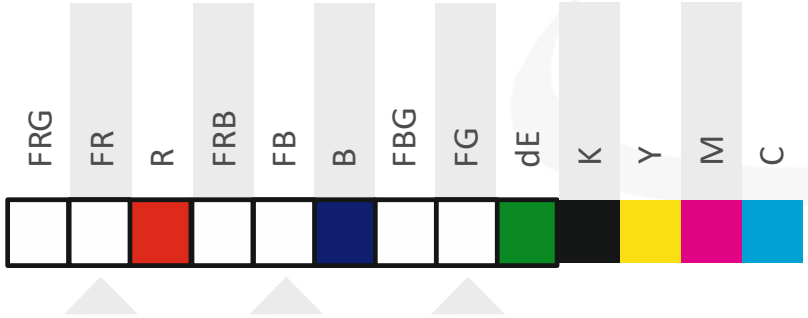


FLUOD DX optical system UV 256nm



Fluorescence and Phosphorescence Quality Control in the press room

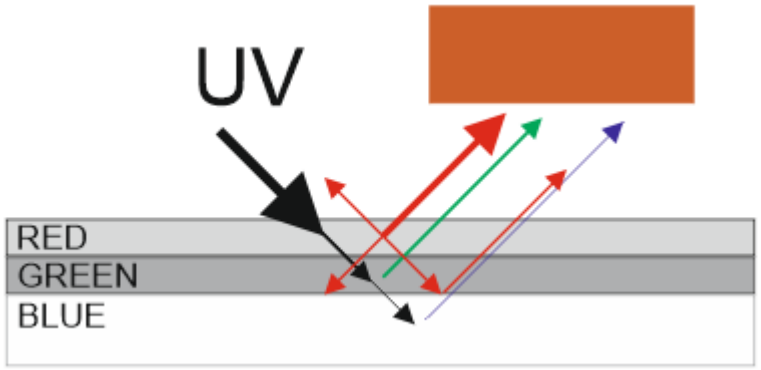


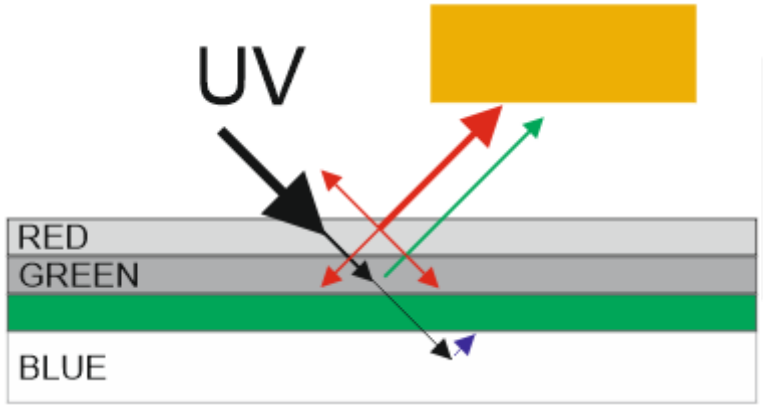


Invisible inks are invisible if not exposed to UV light

- Add invisible ink patches to the color bar
- Add a black frame to invisible ink patches in the color bar
- Add a black description to the invisible ink patches in the color bar
- Measure the invisible ink patches using the FLUO DX colorimeter

Visible vs. Invisible Inks overprint

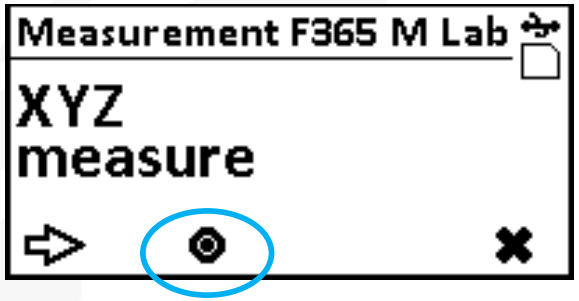


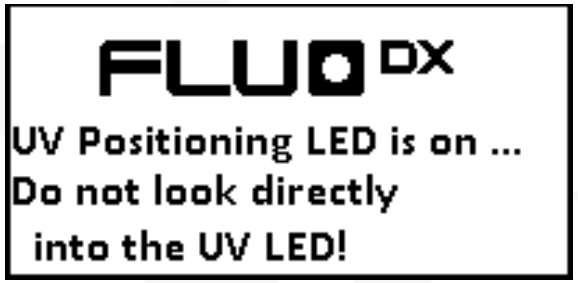


Anti Counterfeiting Applications

- Folding Cardboard boxes
  - Pharma,
  - Food,
  - Spare parts,
  - Others
- Gift vouchers
- Admission tickets
- Public transport tickets

Find the measurement position outside the control bar





- FLUO DX almost in horizontal position
- FLUO DX in parking position
- After 20 seconds the UV light goes off automatically

Usage Scenarios M Int Fluorescence quality control in the press room

- M Int Fluorescence
  - Measure Fluorescence Intensity against a reference or absolute
  - Up to 20 Zones
  - UV256nm or UV365nm

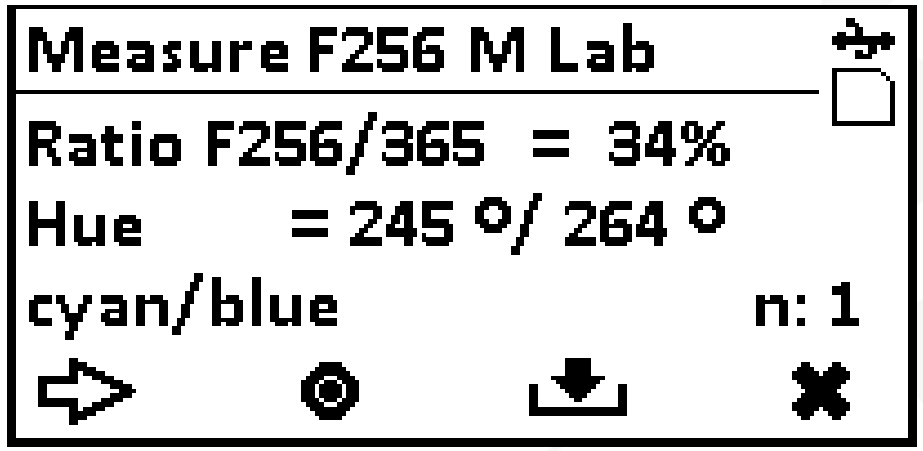
Usage Scenarios M Int Phosphorescence in the press room

- M Int Phosphorescence
  - Measure Phosphorescence Intensity against a reference or absolute
  - Up to 20 Zones
  - Up to 10 Readings for every single Zone with automatic average calculation
  - UV365nm

Usage Scenarios M Lab

- M Lab Fluorescence UV256nm and UV365nm
  - XYZ
  - xy
  - Lab
  - LCh
  - BiFlu
  - Delta E

Check the BiFluorescence of a sample



When measuring with F256, the BiFL Information is displayed in addition to other color information

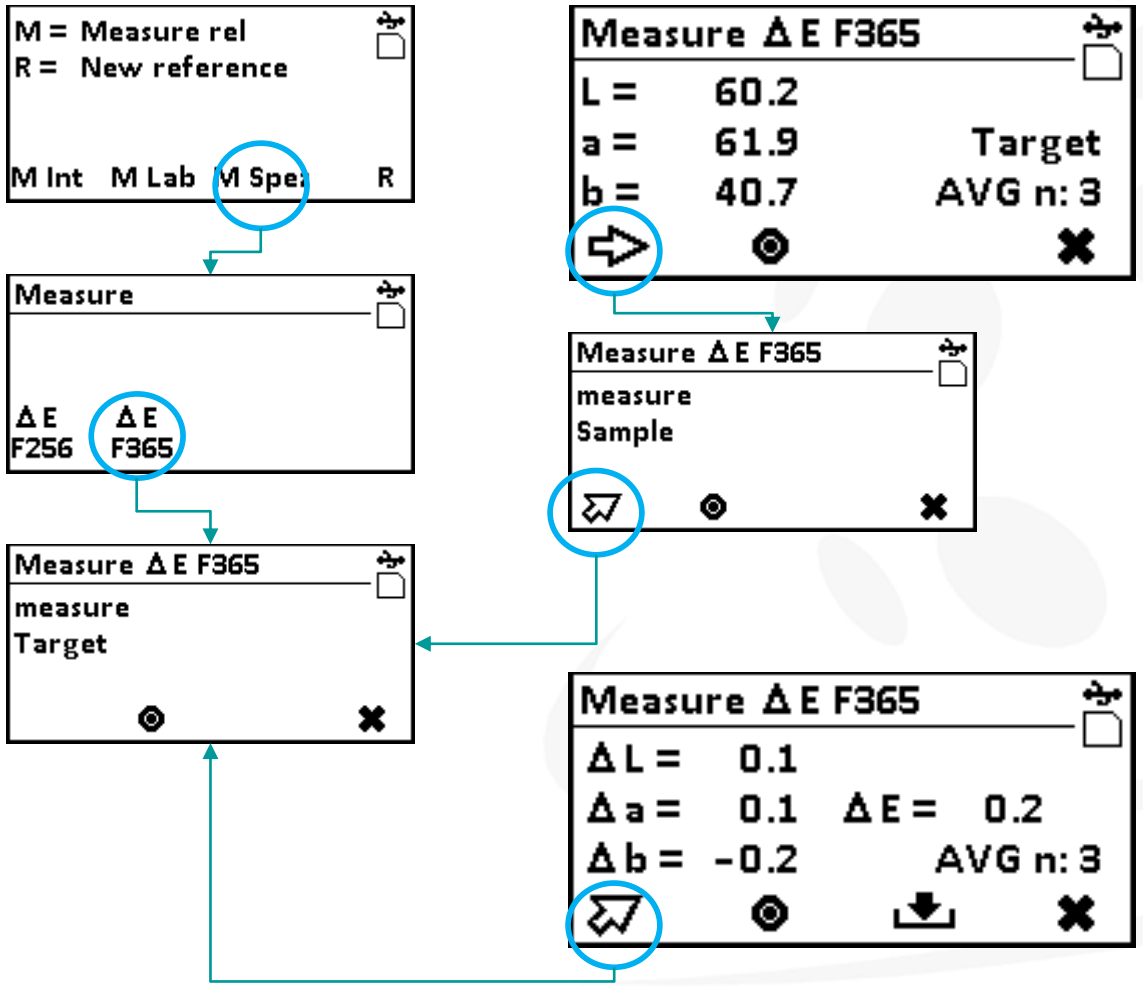
Ratio

The sample glows 34% as strongly when excited with 256nm as it glows when excited with 365nm

Hue

The sample glows in cyan color when excited with 256nm but it glows in blue color when excited with 365nm

Measure Delta E with 256nm or 365nm illumination

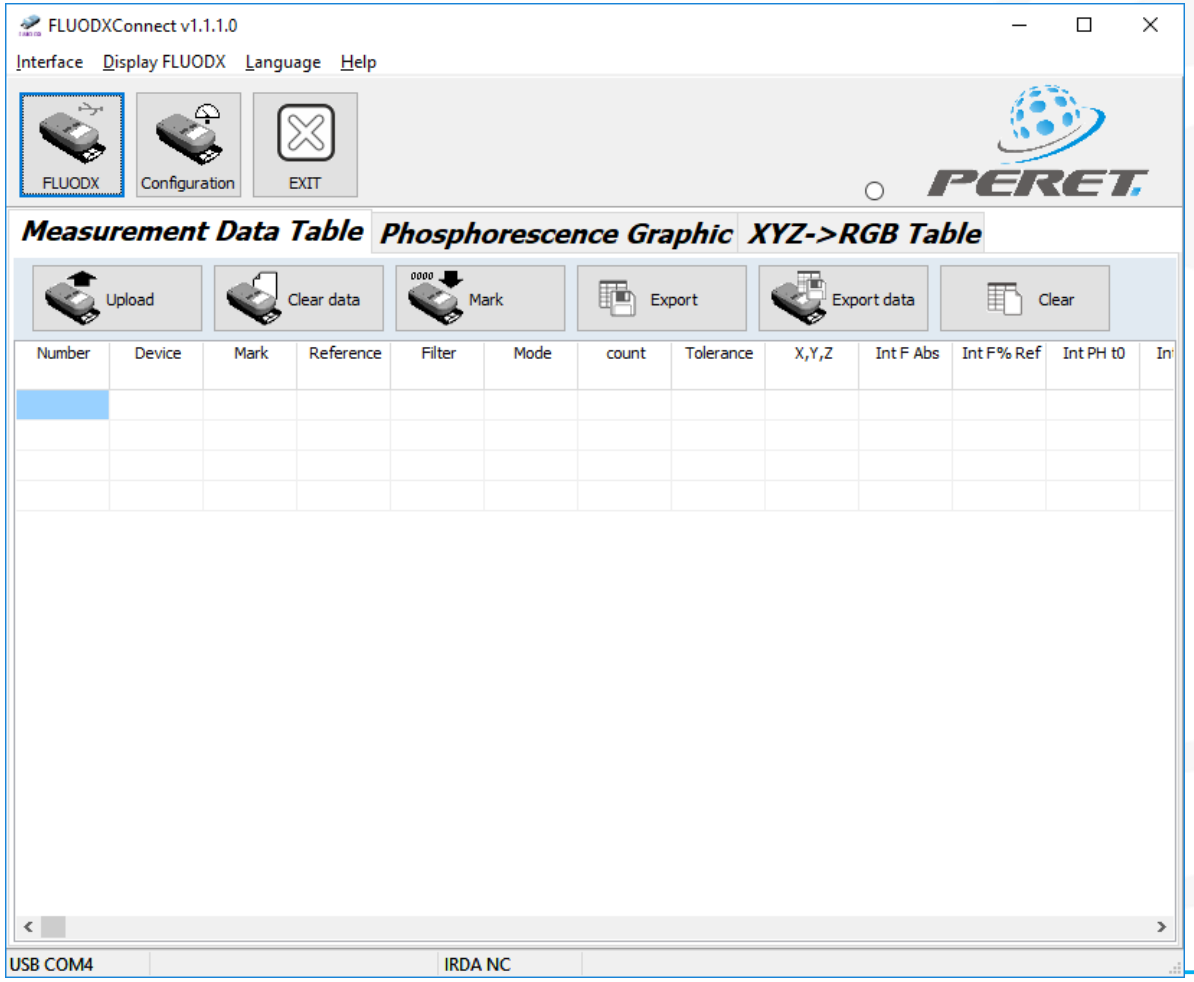


- Measure the Target several times. The average of the measurements is calculated and displayed
- Measure the sample several times. The average of the measurements is calculated and displayed
- Save the measurement and upload it to the PC later (Target and Sample)

Usage Scenarios M Lab Phosphorescence Anaylsis

- M Lab Phosphorescence UV365nm
  - Charging / Discharging Curve
  - Phosphorescence Intensity after cool down time
  - Relative Phosphorescence Intensity after cool down time
  - Charging / Discharging Time estimate
  - AK1/AK2 Discharging level time

FLUODXConnect Software



Main Screen Functions

- Upload data from the FLUO DX and export it to a file
- Test phosphorescence samples to find the best parameter setting
- Measure fluorescent colors and display the visual perception

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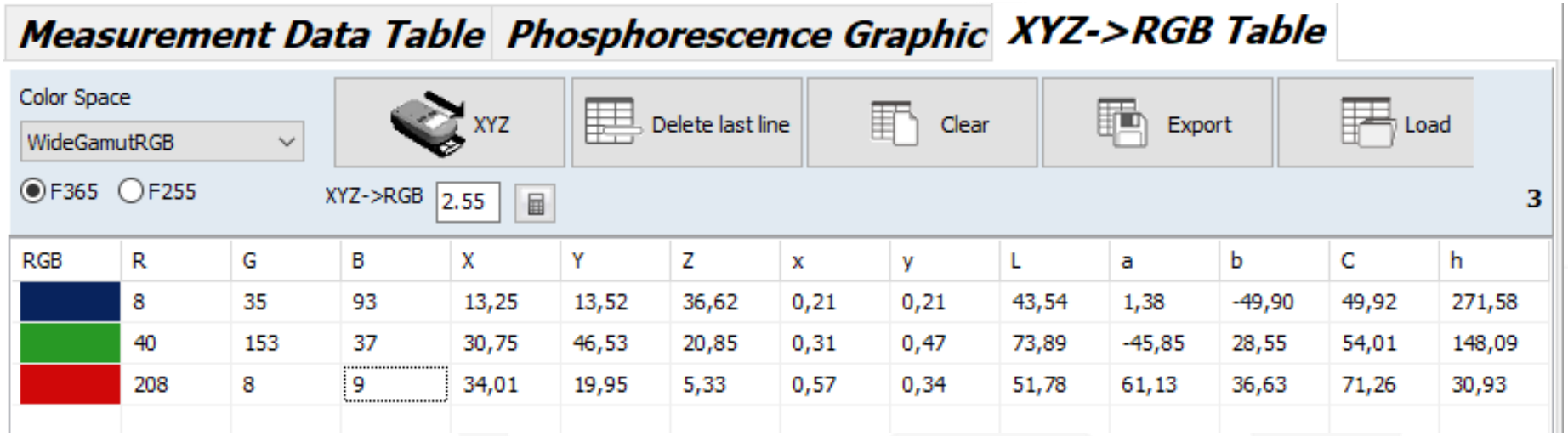
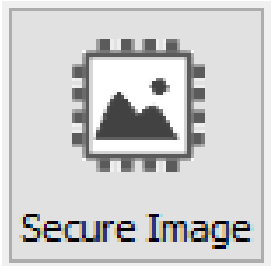
Measure Fluorescent Colors



RGB	R	G	B	X	Y	Z	x	y	L	a	b	C	h
	8	35	93	13,25	13,52	36,62	0,21	0,21	43,54	1,38	-49,90	49,92	271,58
	40	153	37	30,75	46,53	20,85	0,31	0,47	73,89	-45,85	28,55	54,01	148,09
	208	8	9	34,01	19,95	5,33	0,57	0,34	51,78	61,13	36,63	71,26	30,93

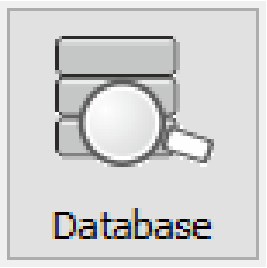
- Select the Illumination UV365nm or UV255nm
- Select the Brightness Factor XYZ->RGB (2.55 default)
- Click the XYZ Icon to perform a reading
- Export data to a file

FLUODXConnect PRO Software – easy jump into security printing



- Create your own security element with a few mouse clicks based on a simple Jpeg, Png, Bmp Image

- Save and restore reference colors in a database. Organize colors by customers and jobs



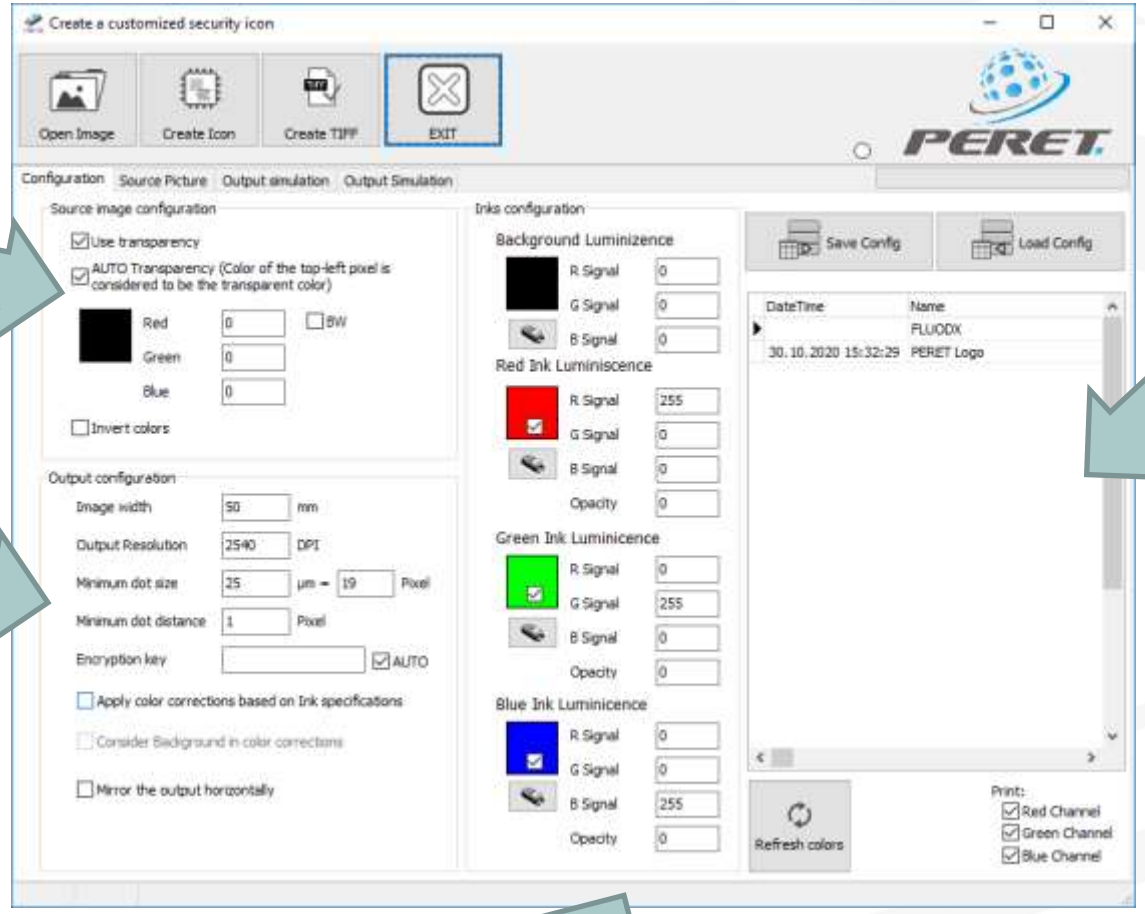
- Save measurement data to a database. Create reports and print data analysis

FLUODXConnect PRO Security Element creation

Secure Image

Handling of source image

Output parameters are unique and confidential



Settings are stored in a database

Color specifications are confidential

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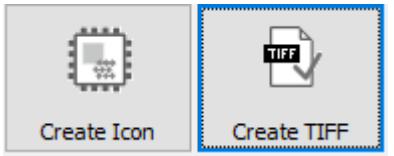
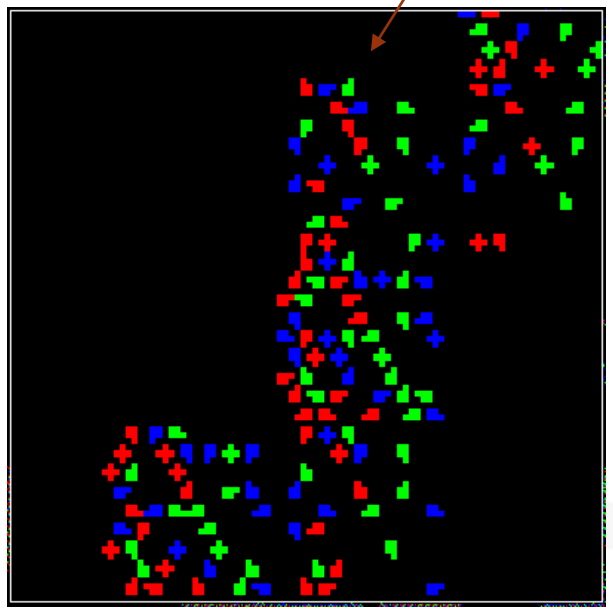
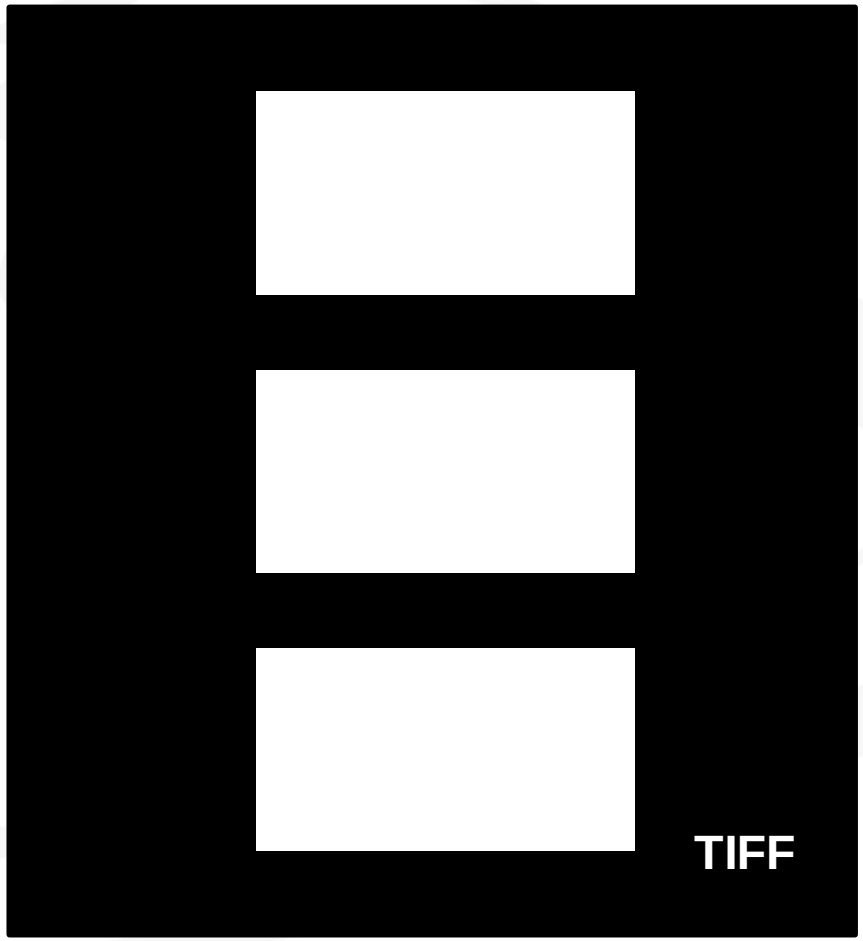
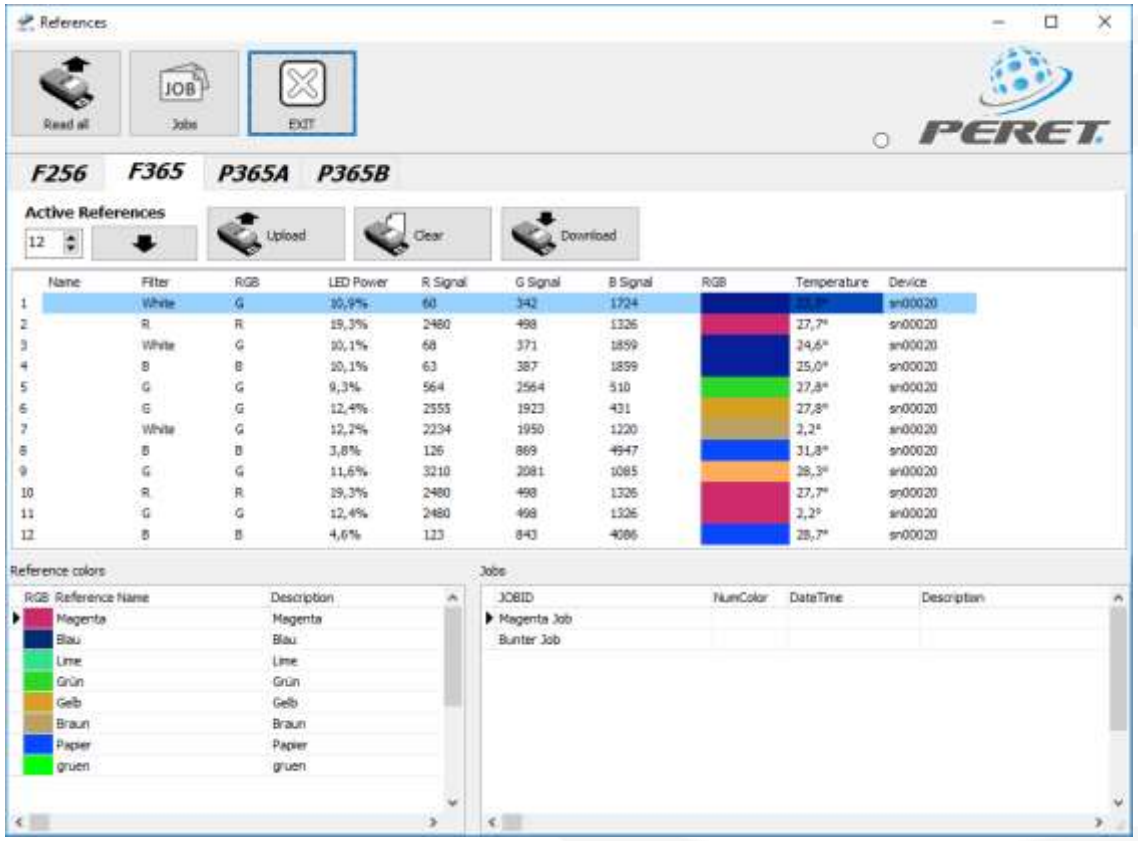
FLUODXConnect PRO Security Element creation

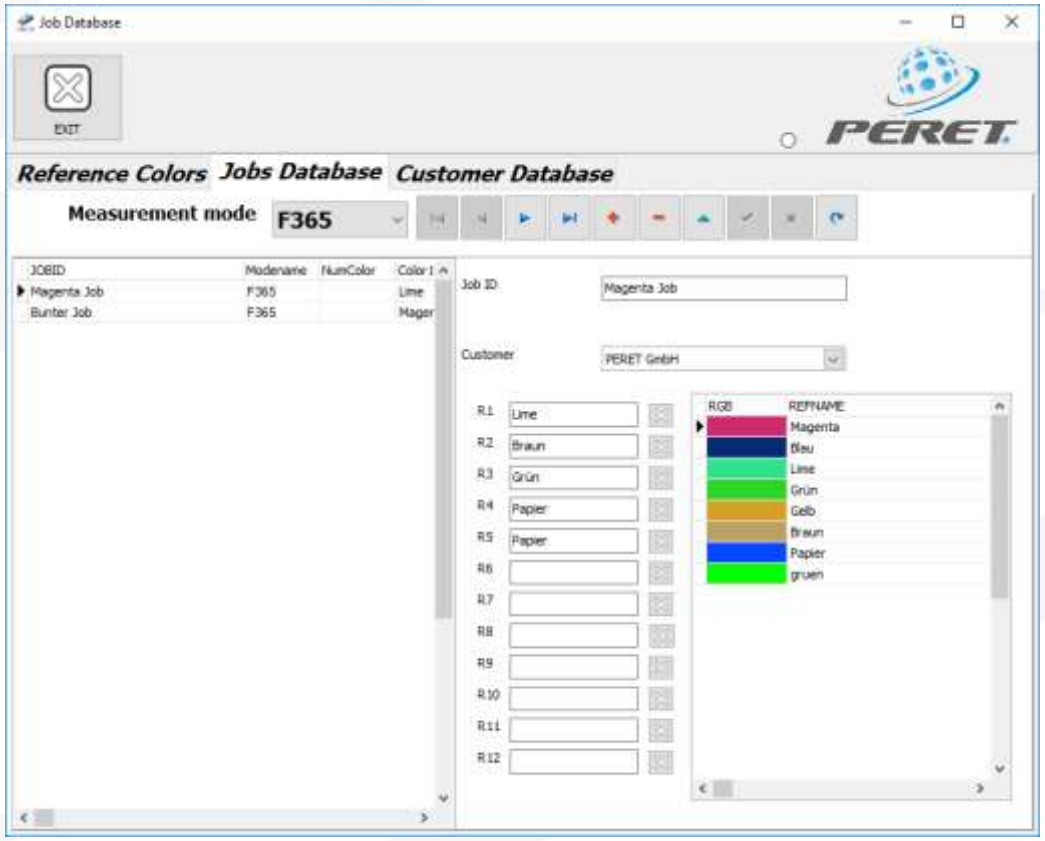




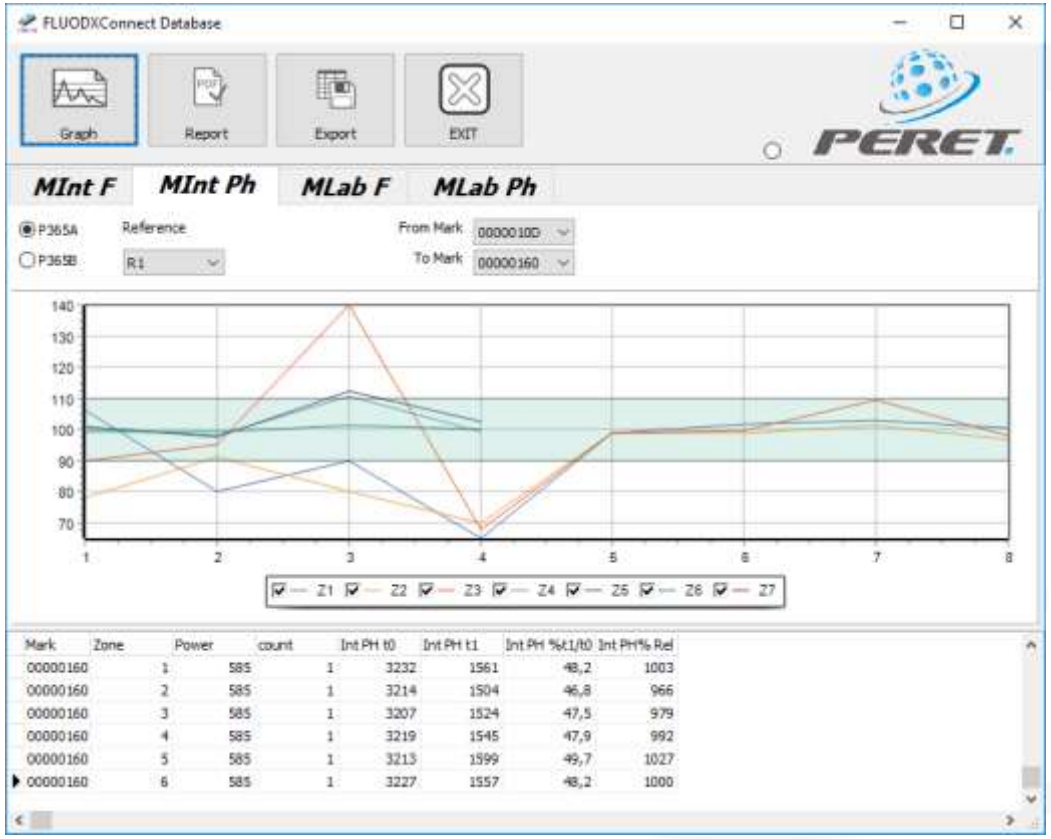


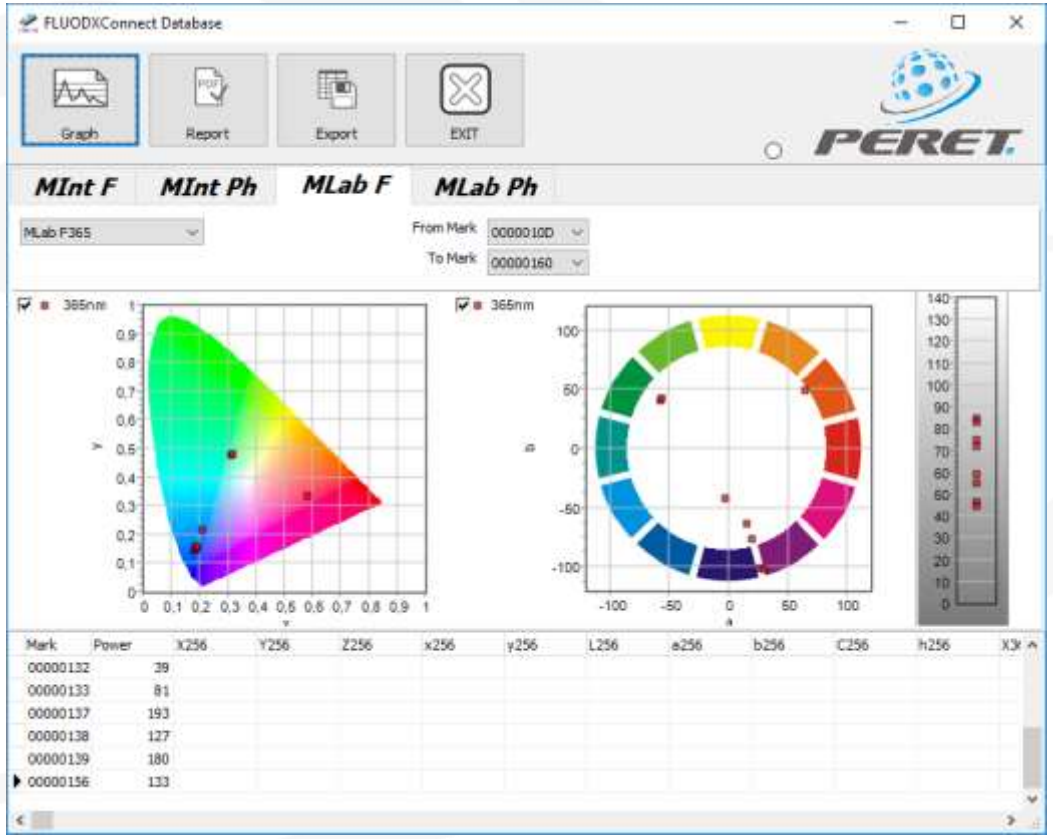
FLUODXConnect PRO Reference color management





FLUODXConnect PRO Measurement data reports





See what happens

Understand why it happens

Take corrective actions