Measurement Challenges For Non Paper Substrates

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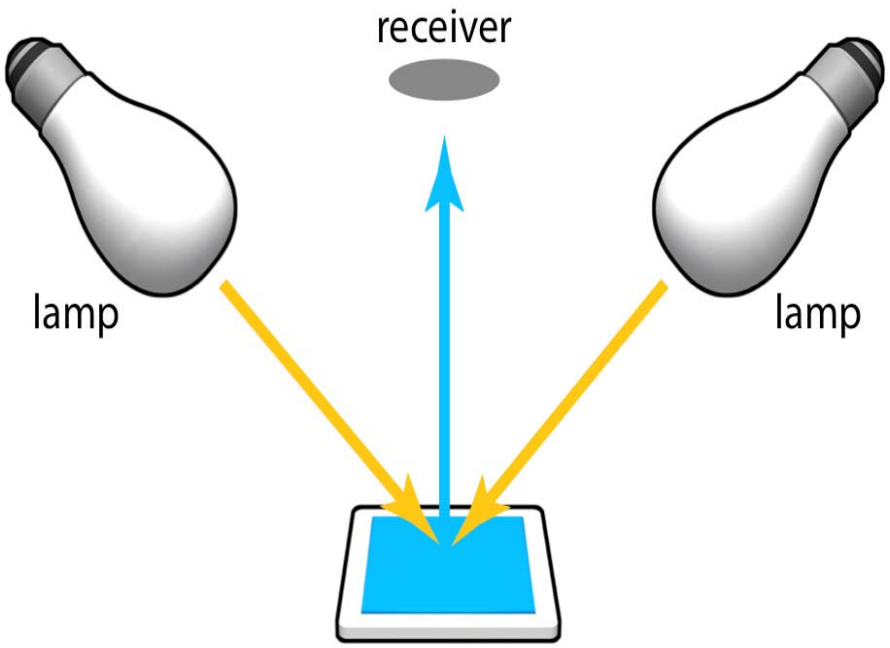
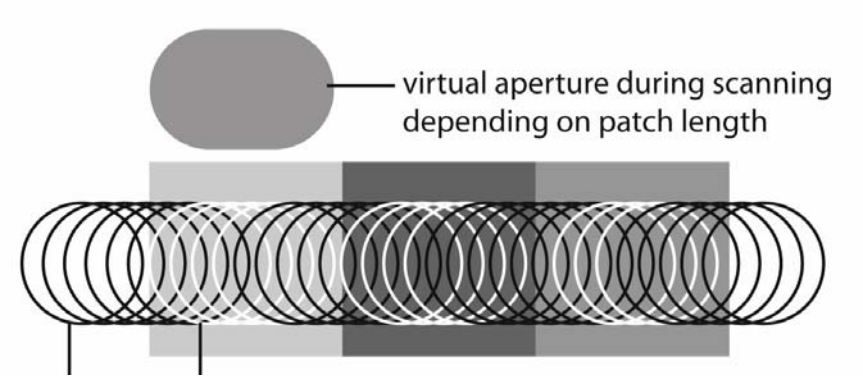
Let's start with the Basics

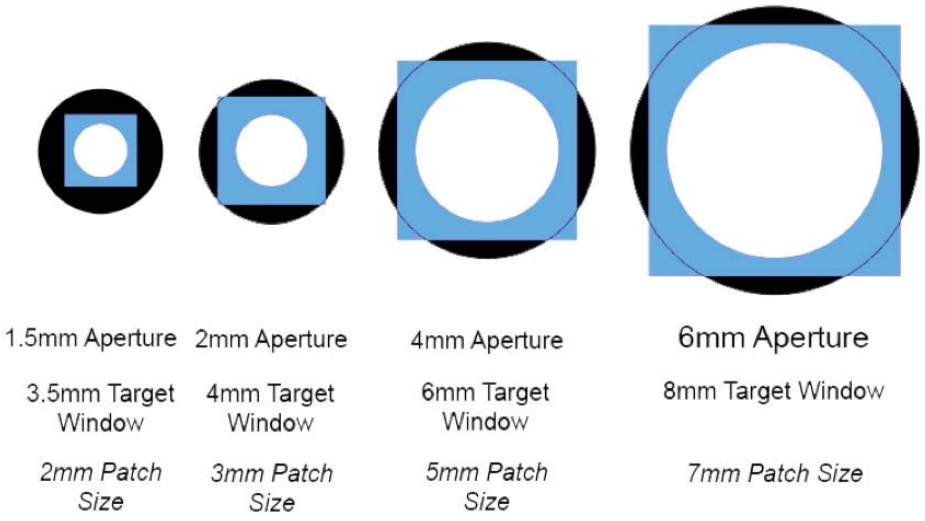
- Classic paper measurement is done with a 0:45 or 45:0 measurement device
- Spectrophotometer (a.k.a. Spectro) – A device that illuminates a sample, and measures the amount of light reflected (or transmitted) at various wavelengths



Aperture Size

- **Traditionally in print the smallest aperture appropriate for the linescreen or DPI is used**
  - Substrate is very smooth and homogeneous
- **In grand format this is not always the case**
  - Printer may be capable of finer DPI
    - May not be used depending on application/speed
- **Non paper substrates are often rougher**
  - Better to use a larger aperture
- **Other options**



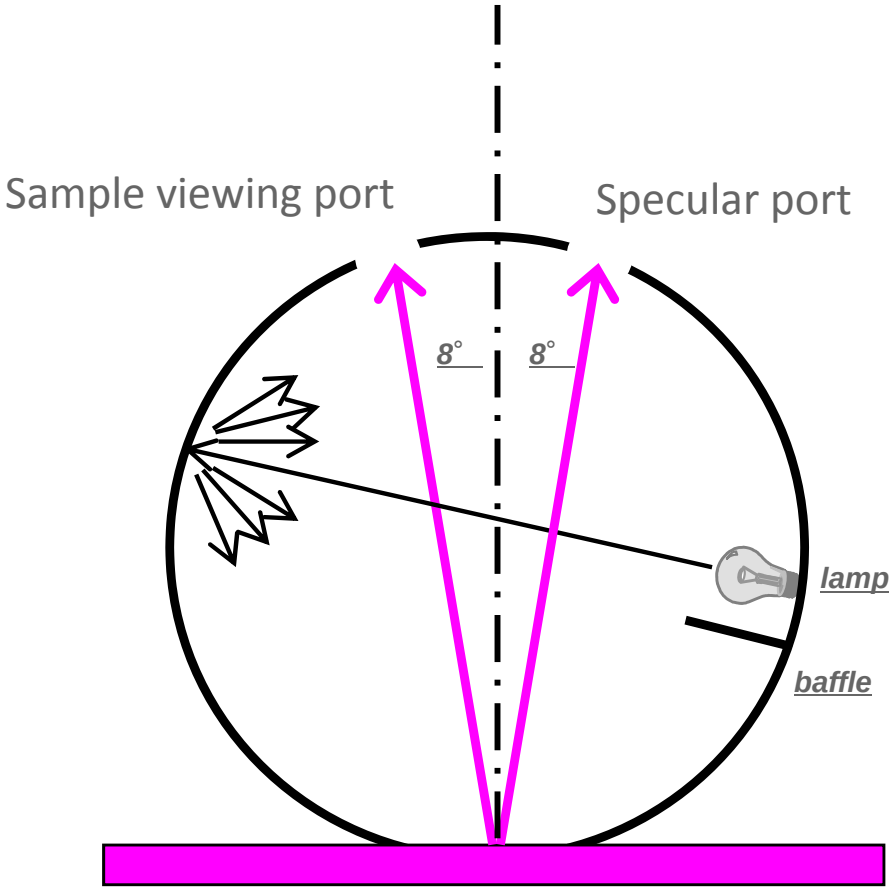


Non 0:45 devices

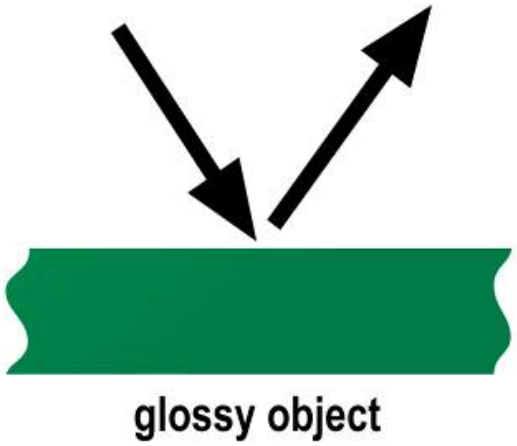
- **Sphere D:8**
- **Transmission**
- **Imaging Spectros**
- **Multiangle spectros**

Traditional Industrial Geometry

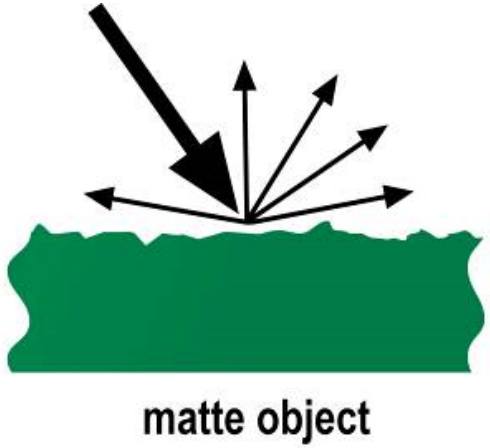
- **Sphere D:8**



So Glossy, Flat or Matte – Is that all?



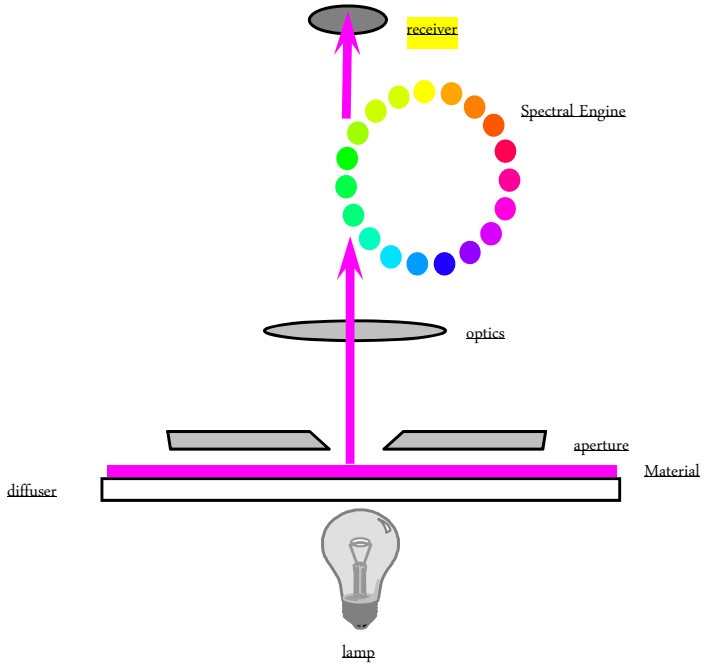
glossy object



matte object

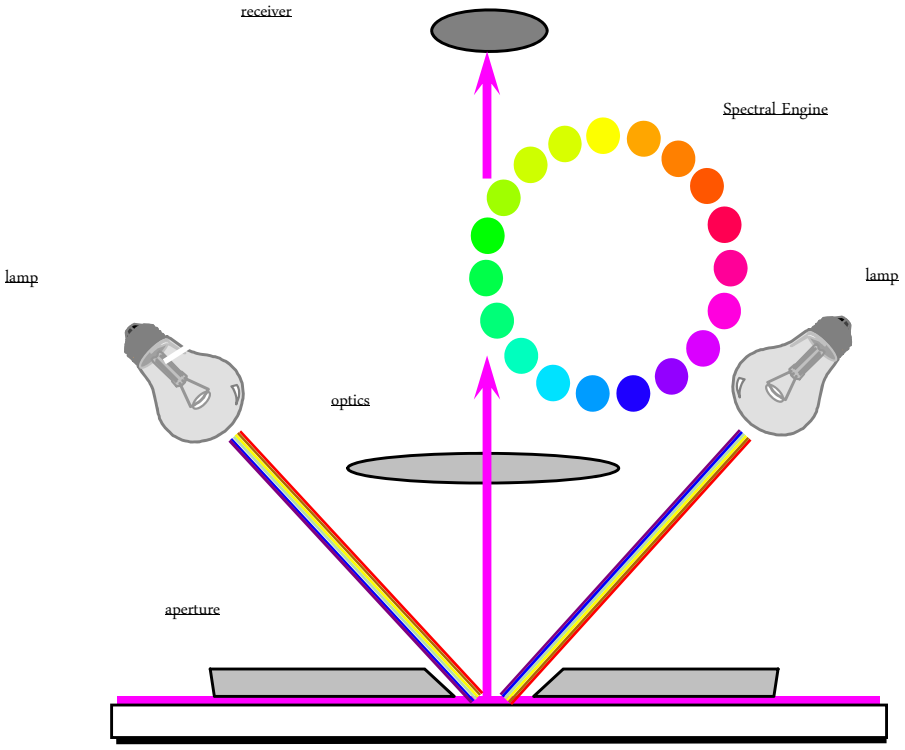
Transmission

- **Aperture Size**
- **Definition of the light**
  - D50
  - “D50”
  - Other
- **Material being measured**
  - Vinyl/Film
  - Fabric
- **End use**
  - Day/Night backlight



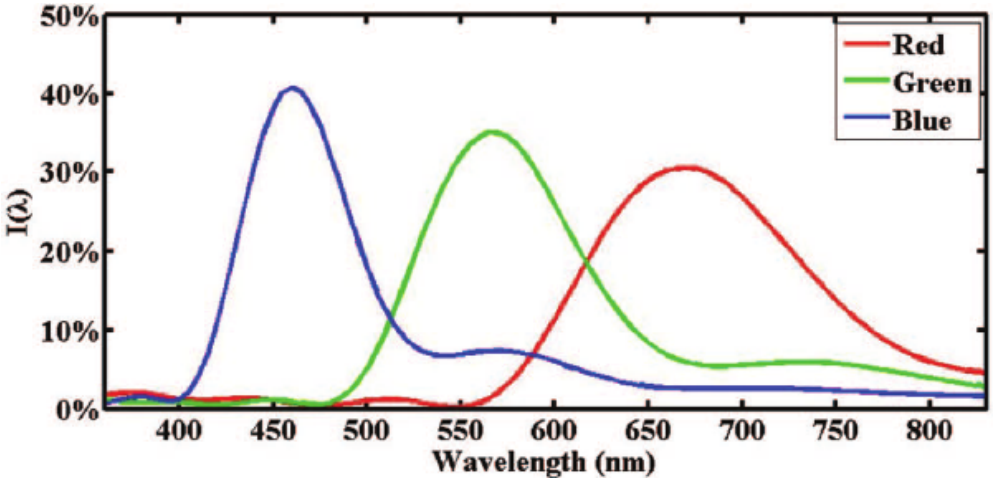
Traditional Spectro

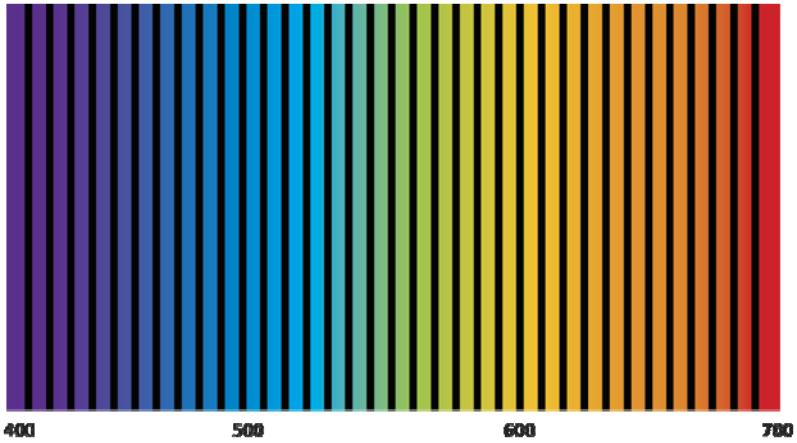
- **Capture the light reflected by the sample that is inside the aperture – a single set of reflectance data**



Imaging Spectro

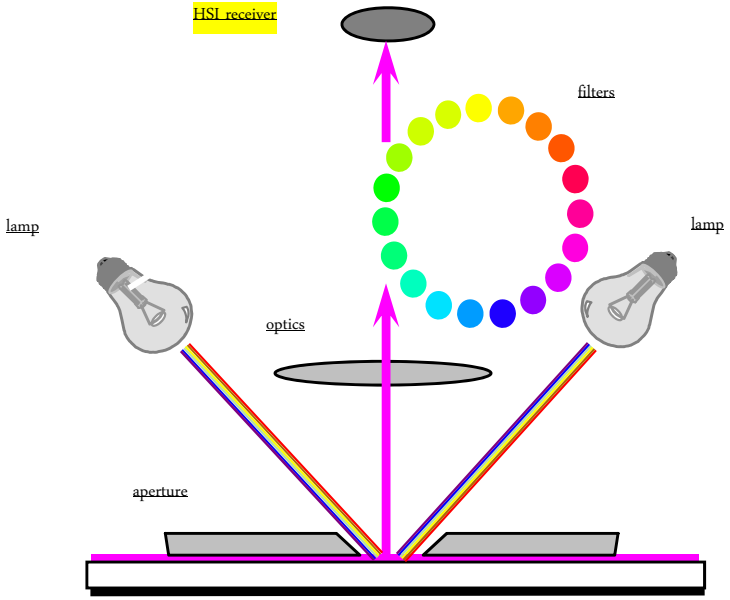
- **HSI – Hyper Spectral Imaging**
  - Uses a “true-color” camera, capable of providing reflectance data per pixel vs. typical RGB color cameras





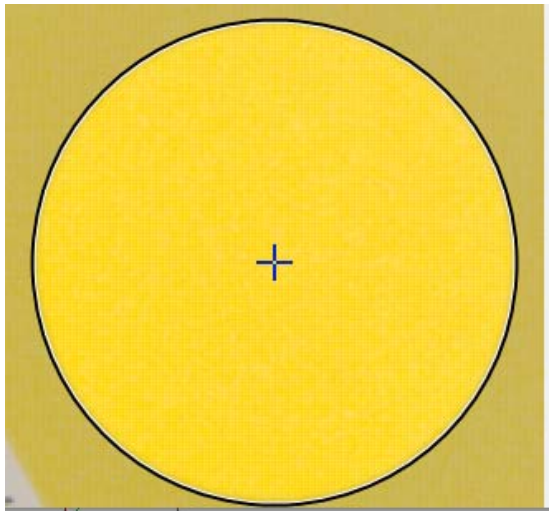
Imaging Spectro

- **Capture the light reflected by the sample that is inside the aperture – a set of reflectance data per pixel**



Use Case #1

- **Standard Spot Measurement (Simple)**
  - Whatever fills the aperture is measured
  - Combined reflectance data for all pixels
  - Mimics a traditional Spectro maintaining inter-instrument agreement



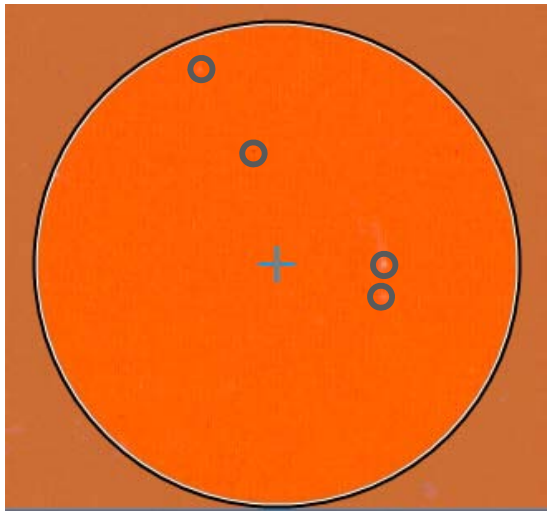
Sample

Traditional

HSI Simple

Use Case #2

- **Removing artifacts/defects (Smart Spot)**
  - Measure the full area
  - Smart Spot algorithm eliminates the pixels that are outliers – defects, pin-holes, shadows, highlights, etc.
  - Compare Simple & Smart Spot for print quality



DL*	Da*	Db*	DE*	DE2000
0.72 L	0.07 R	1.60 Y	1.75	0.67

Smart Spot vs Simple

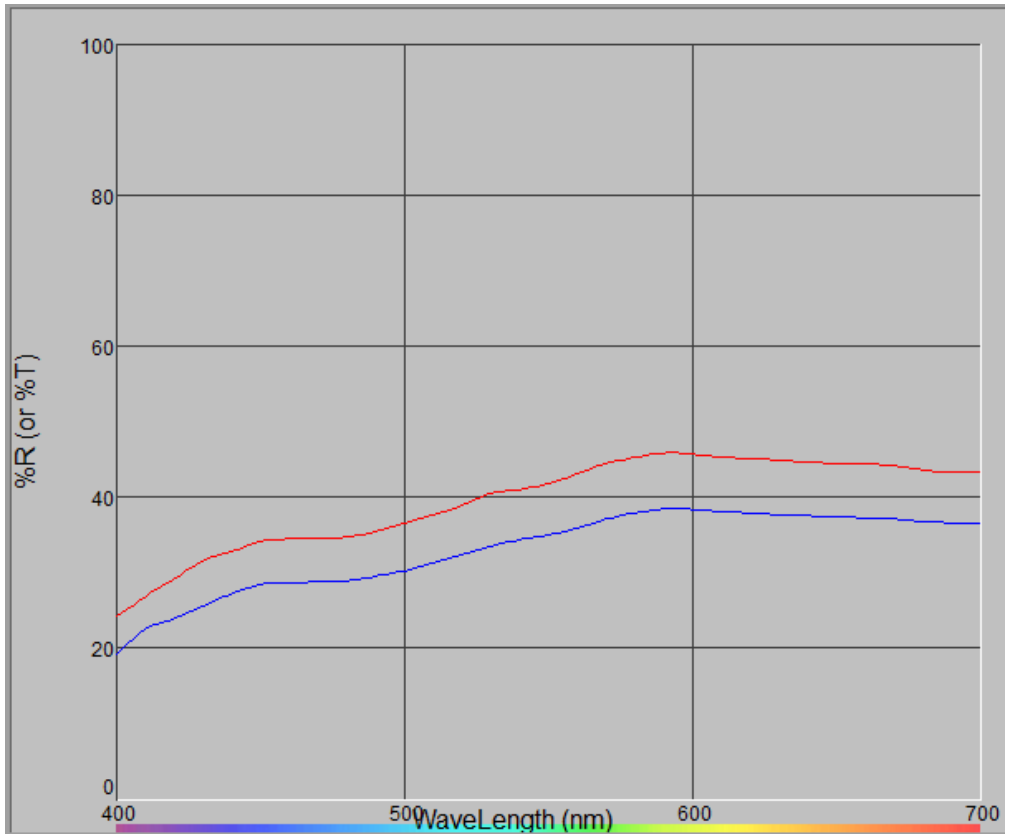
Sample

Traditional

HSI Smart

Use Case #2

- **Stucco – an extreme example**

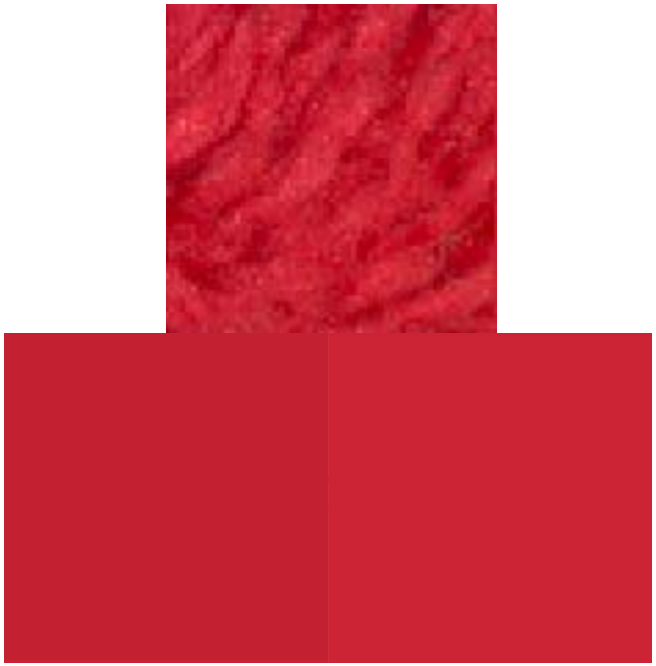


Smart Spot

Simple

Use Case #3

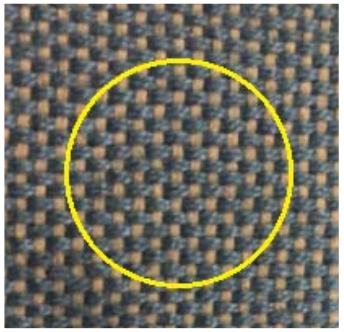
- **Color Standards & Formulation**
  - Customer provided color standards can provide challenges
  - Smart Spot provides the real desired color

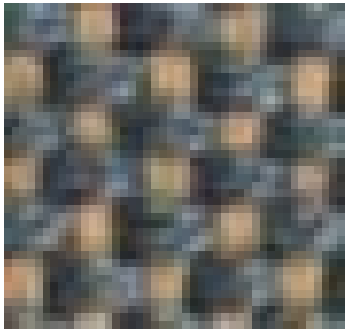


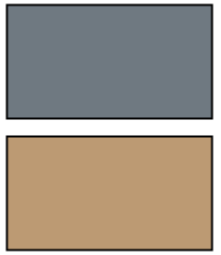
Simple Smart Spot

Use Case #4

- **Multi-Color Measurement**
  - Does not require a full patch for each color
  - A textile example







Sample

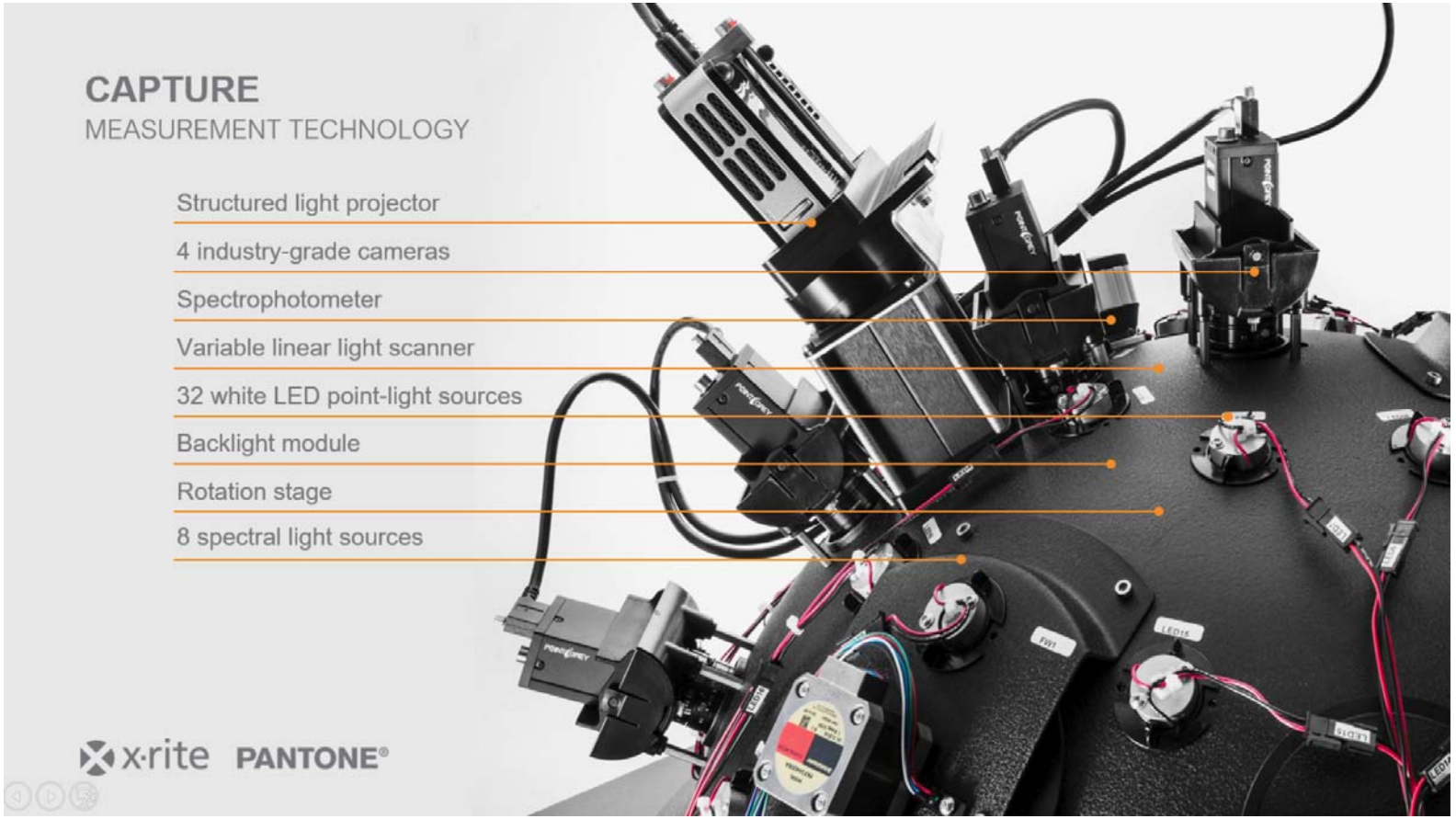
Traditional

HSI Multi

Imaging Devices in Other Workflows

- TAC Ecosystem
  - Total Appearance Capture TAC7
  - Pantora Material Hub
  - AxF Files
  - Virtual Light Booth
- Material capture for 3D design

Imaging Devices in Other Workflows



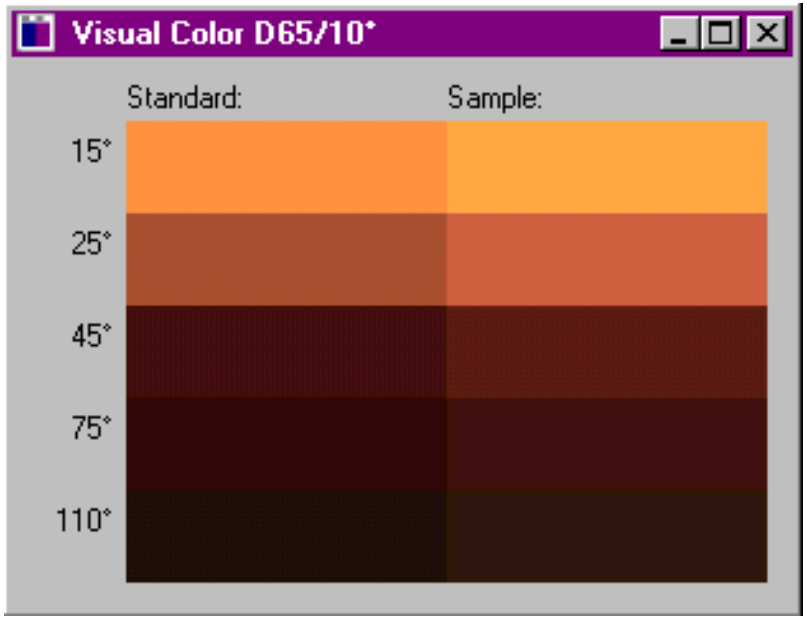
Imaging Devices in Other Workflows

Imaging Devices in Other Workflows

- **MA-T Multi-Angle Instruments**
  - Traditional & Imaging
  - 6 or 12 measured angles
  - Imaging for effect QC

Multi-Angle Measurements Why We Use Them

- **Change Optical Properties with Illumination and Viewing Angles**
  - Metallic
    - Extend / enhance the gloss or specular appearance
  - Mica / Interference additives
    - Change appearance at all viewing angles. Some may introduce strong shifts in both lightness and hue
  - Pearlescent
    - Make surfaces appear to shimmer
      - haze effects



Thank You