Kodak

ColorFlow Workflow Edition

Print process control for Prinergy Workflow

What is ColorFlow?

A print process control and color relationship management solution, fully integrated with Kodak Prinergy Workflow

- Manages Tonal Calibration and Color Relationships for all print devices in your environment

- **ColorFlow Workflow Edition** creates, edits and manages Tonal Calibration Curves for print process control

- **ColorFlow Pro Workflow Edition** additionally manages Color Relationships and Ink Optimization

ColorFlow Workflow Edition
Training

Scope: the creation, editing and management of Tonal Calibration curves for Prinergy Workflow

- Intro to Process Control and Industry Standards
- ColorFlow User Interface
- Creating and managing Plate Curves
- Creating and managing Print Curves
  - Measuring a printed Characterization chart
  - Choosing a Print Reference Target
- Generating Reports

Print Process Control

What is Print Process Control?

- Ability to measure and control the amount of ink printed for each color, at each tonal level, for each print run

- Necessary for consistent, predictable results

- Must control each step of the process:
  - Platemaking: **Plate Curves**
  - Press Results: **Print Curves**

Steps of Process Control

- Must be able to maintain a stable print condition
  - Consistent *Solid Ink Densities* and *Dot Gain*
- Print a test target
- Measure the printed target
- Choose a desired quality target
  - Known as a *Reference Device Condition*
- ColorFlow generates Calibration Curves to match the target condition
- Verify print results


CMYK Tint Ramp Chart v2.2
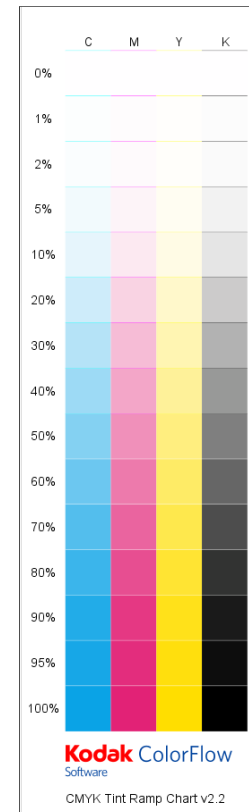
Process Control Terminology

- **Print Density:** measurement of light reflected off ink

- **Dot Gain:** halftone dots print darker than requested
  - Natural and expected
  - **Physical gain**: liquid ink spreads and increases halftone dot size on substrate
  - **Optical gain**: halftone dots absorb light due to light scatter in substrate and appear larger

- **EDA:** *Effective Dot Area*
  - Measured* size of a halftone dot expressed as a %

- **TVI:** *Tone Value Increase*
  - Amount halftone dots increase in size due to gain
  - Measured as an absolute percentage
  (eg) printed 50% dot that measures 65% has a *TVI of 15%*

Process Control Terminology (cont'd)

- **Linear Output:** imaged value is the same as the electronic file value (input = output)
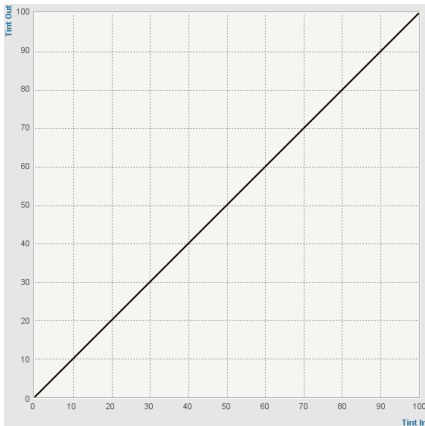
- **Plate Curve:** used to adjust plate imaging so plate is accurate *("linear")*

- **Print Curve:** used to adjust print results to match a desired target

Dot Gain is Expected and Desirable

- Printed results not expected to be linear – will look washed out if printed that way

- Goal is not to eliminate dot gain, just control it

- Target print responses are based on desired gain
  - Desired mid-tone gain (TVI) is typically between 18-22% (resulting in EDA of 68-72%)

Factors affecting Dot Gain

- All print factors combine to create a unique *"Device Condition"* that must be managed with a unique set of Tonal Calibration Curves

    - **Press** *(offset, letterpress, flexo, screenprinting, digital, etc.)*

    - **Plate** *(offset, thermal head, UV head, flexographic, etc.)*

    - **Substrate** *(paper, poly, coated, uncoated, calendered, etc.)*

    - **Inks** *(chroma, densities, viscosities, grind, etc.)*

    - **Halftone dots** *(frequency, shape (AM vs stochastic), etc.)*

    - **Other** *(drying, curing, press speed, humidity, etc.)*

Target Print Response

"How you want your device to print"

- **Shop standard:** legacy information or internal specs *("the numbers from our old RIP"* or *"the pressman told me to take 3% out of the Magenta at the mid-tone")*

- **Industry standard:** agreed-upon colorspace description that provides a reference for accurate color reproduction across different devices and applications
    - **SWOP** (Web offset)
    - **GRACoL** (Commercial Offset Lithography)
    - **FOGRA** (European)
    - **ISO**
    - **Others…** (IFRA, SNAP, JNC, JCW…)

Managing Gray Balance

- Eye extremely sensitive to gray casts *(reddish, bluish, or yellowish appearance)*

- Relative equal amounts of C, M and Y produce gray

- Control appearance of gray areas and other colors will fall into place

- Must manage tonality with gray balance in mind
  - To "make it lighter" you must remove different amounts of CMY

- G7 Gray balance control method used in latest GRACoL and SWOP standards
  - ColorFlow Workflow Edition supports G7 P2P25 charts for gray balance calibration
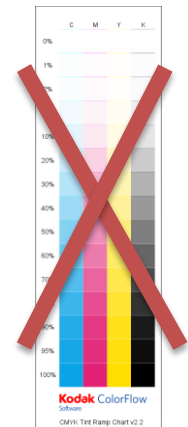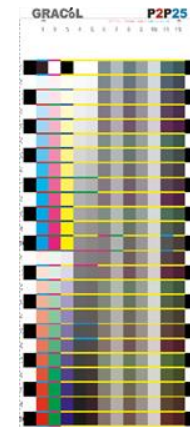
Special Print Conditions and Curves

- Some print processes *(eg. flexo)* have limited ability to print highlight dots
  - Said to have *"limited highlight resolution"*
  - Lightest dots have excessive gain and may measure 10% or more
  - Cannot print smooth gradients starting from white
  - Known as a "discontinuous" print response
  - In ColorFlow, a *Flexographic Device* is used for discontinuous print conditions
  - Require special curves to adjust imaged highlights
    - **Bump Curves:** minimum highlights are increased
    - **Cut-off Curves:** minimum highlights are removed

BREAK – 15 minutes

Using ColorFlow WE

ColorFlow Versions

ColorFlow Workflow Edition

- Print Condition Characterization
- Process Control using Tonal Calibration Curves
- Reporting

ColorFlow Pro Edition

- Print Condition Characterization
- Process Control using Tonal Calibration Curves
- Process Control using Color Relationship Management (CRM)
  - ICC Device Profiles
  - ICC DeviceLink Profiles
- Comprehensive Reporting
- Ink Optimization Solution *(Option)*

Beyond Workflow Edition…

If time allows, additional ColorFlow Pro capabilities can be introduced at completion of ColorFlow WE training

- **Color Relationship Management (CRM)**
  - ColorSetups manage color across all devices in your shop
  - ICC Separation Profiles and ICC DeviceLink Profiles
  - Comprehensive Print Condition and Verification Reports
  - ColorSetups automate CRM within Prinergy: "auto color"

ColorFlow Workflow Edition

- Create and manage Calibration Curves for plate and print process control

- ColorFlow Workflow Edition only uses Curves tabs on left side of the user interface
    1. Plate Curves
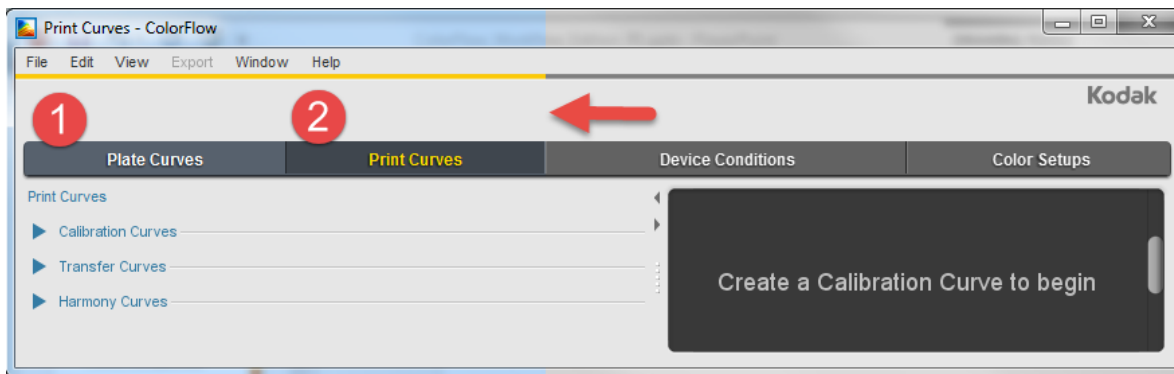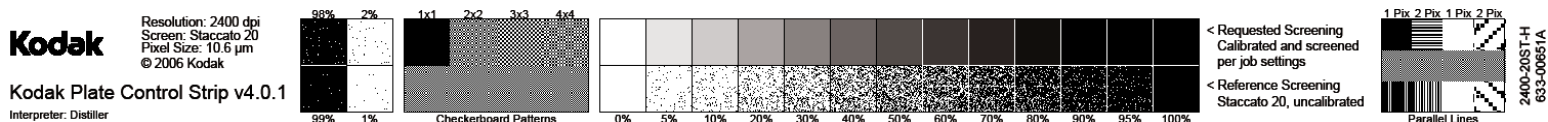   2. Print Curves

Plate Curves

Quick intro to UI

- Calibration Curves
  - Curve management left
  - Properties in right pane
  - Image plate target (see below), measure and enter dot %
  - Desired Plate Response is always **linear**
  - Important: enable "Show in Prinergy"

- Harmony Curves (legacy curve import)

Demo: *Create a Plate Calibration Curve*

Print Curves

Quick intro to UI

- Calibration Curves
  - The Device Condition targets a Reference Print Condition
  - Target (top) linked to Device Condition (bottom)
  - Verify?
- Transfer Curves
  - Use to adjust output based on request (without measured targets)
    - First adjust overall response at midtone
    - Then adjust highlights, ¼ tones, mids, ¾ tones, shadows
  - C3 curves built-in for Flexcel NX media
- Harmony Curves (legacy curve import)

Demo: *Create a Print Calibration Curve*
Demo: *Create a Print Transfer Curve*

Using Legacy Harmony Curves

- No need to edit? Continue to use Harmony Curves "as is"

- Need to "mix and match" Harmony and CF curves?
  Then must convert to a common curve source (CF)

- May have Harmony curves from a consultant (G7)

- Plate Curves
  - Can only edit "derived" Harmony curves

- Print Curves
  - Can only edit Transfer Harmony curves
  - Not suitable for "node-based editing" (based on table of values)
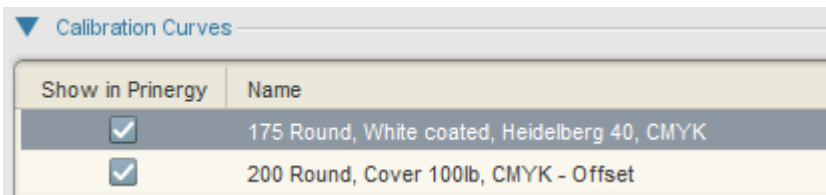 - Can adjust tonal ranges

Demo: *Import Plate Curve, copy Derived Curve for Edit*
Demo: *Import Print Curve, copy to Transfer*

Using ColorFlow curves in Prinergy

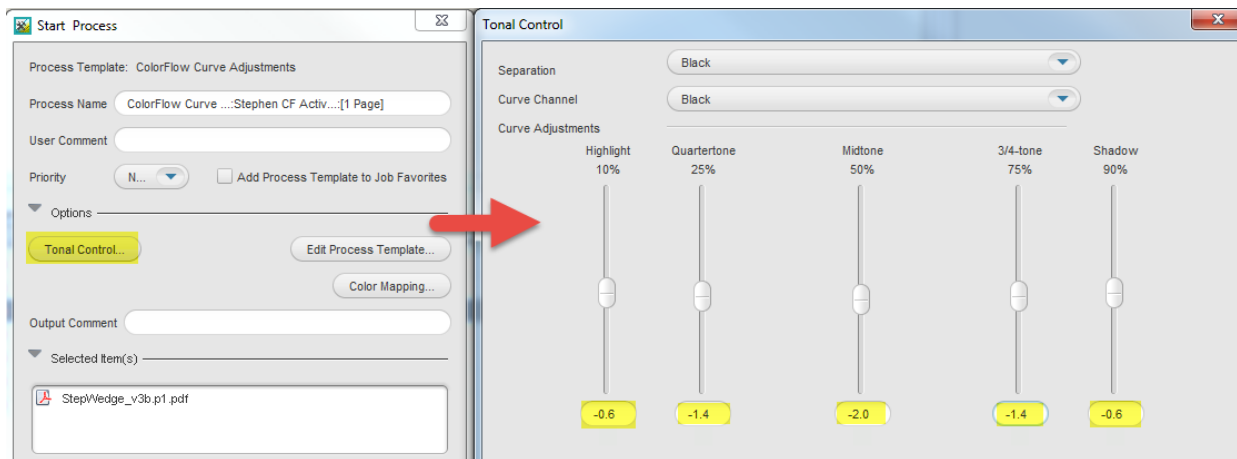- *In ColorFlow:* curves must be enabled for Prinergy

- *In Prinergy Output Process Templates:* choose relevant Curve Source and select desired curves from drop-down menus
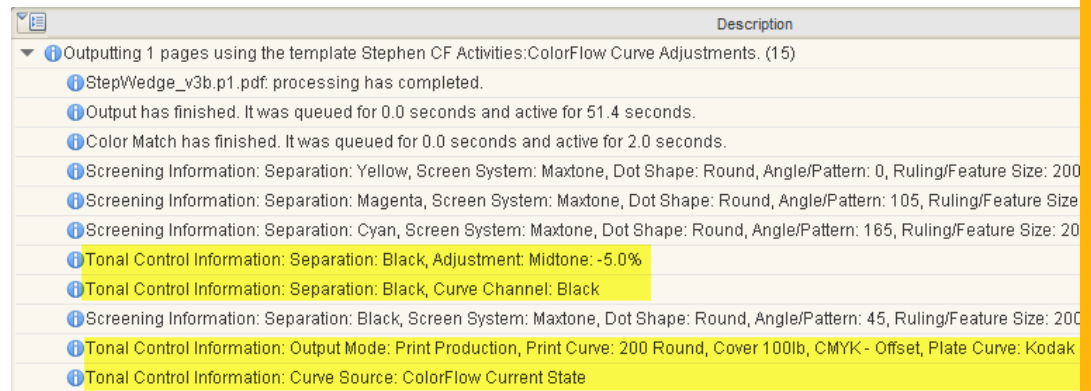
Using ColorFlow curves in Prinergy

- ColorFlow curves can adjusted on the fly upon output

- Curves/adjustments reported in Prinergy Process Info and History

Verification and Reports

- Reports useful for monitoring quality control
- Generate characterization Report from Measurements ⊕
- Optional: run a Verification target and Report ☑
  - *Predicted Color Response:* how closely ColorFlow **expects** to match the selected Calibration Target
  - *Measured Verification Run:* how closely calibrated print condition (curves applied) **actually** matches desired Calibration Target
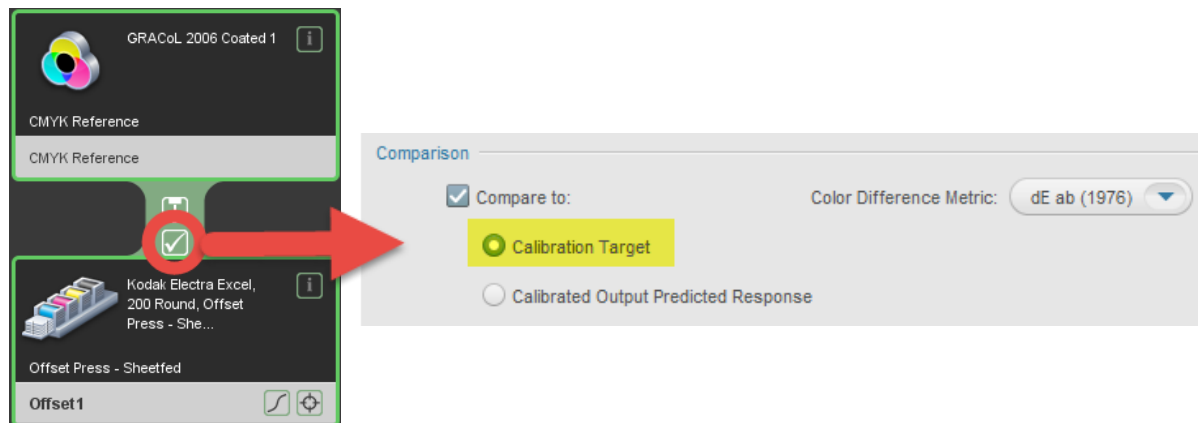
Learning Activities

Learning Activities

Activity 1: [Use a plate curve to linearize a plate](#)

Activity 2: [Use a transfer curve to control tonal response](#)

Activity 3: [Use a transfer curve to control Flexographic print response](#) *(for flexographic printers only)*

Activity 4: [Use a print curve to align a press with an industry specification for tonal match](#)

Activity 5: [Use a print curve to match a legacy workflow calibration curve](#)

Activity 6: [Use a print curve to align a press with an industry specification for gray balance](#)

Activity 7: [Add a spot ink to a print calibration curve](#)

Activity 8: [Use Verification reports to verify color response with a print curve](#)

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