

ColorCert BestMatch™ Guidance

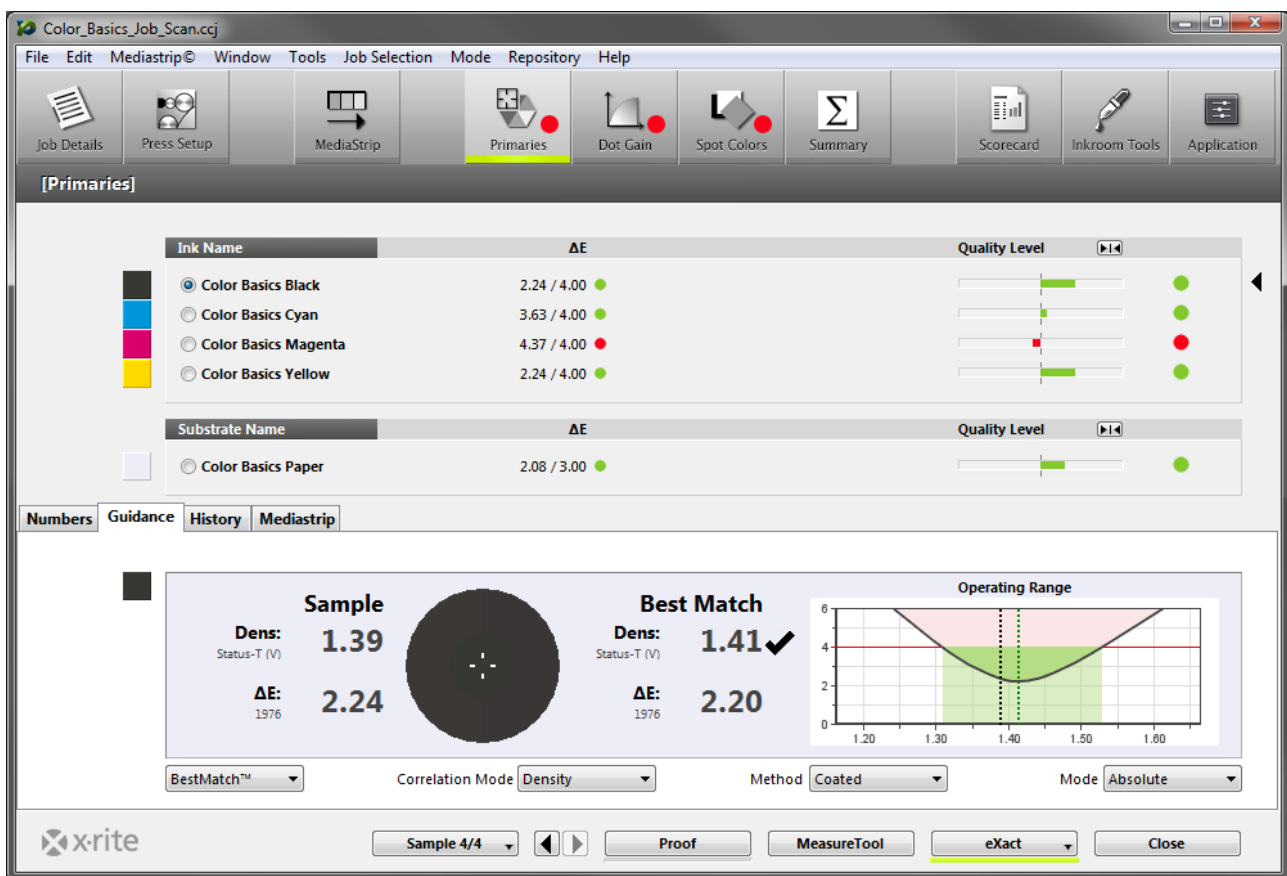
Version History

- October 12th 2016 - Version 1.0
- March 31st 2017 - Version 1.1 (Updated support links)

Scope

This document describes the BestMatch™ guidance function in the Pressroom Tool.

Solution Summary



The screenshot displays the ColorCert BestMatch software interface. The top menu includes File, Edit, Mediastrip, Window, Tools, Job Selection, Mode, Repository, and Help. The main window is titled "[Primaries]" and shows a table of ink and substrate data.

Ink Name	ΔE	Quality Level
Color Basics Black	2.24 / 4.00	Green
Color Basics Cyan	3.63 / 4.00	Green
Color Basics Magenta	4.37 / 4.00	Red
Color Basics Yellow	2.24 / 4.00	Green

Substrate Name	ΔE	Quality Level
Color Basics Paper	2.08 / 3.00	Green

Below the table, there are tabs for Numbers, Guidance, History, and Mediastrip. The Guidance tab is active, showing a sample measurement and a Best Match prediction.

Sample
 Dens: 1.39 (Status-T (V))
 ΔE : 2.24 (1976)

Best Match
 Dens: 1.41 (Status-T (V)) ✓
 ΔE : 2.20 (1976)

Operating Range
 A graph showing the operating range for density. The x-axis ranges from 1.20 to 1.60, and the y-axis ranges from 0 to 6. A red horizontal line is at y=4. A green shaded area is between x=1.30 and x=1.50, and y=0 and y=4. A vertical dashed line is at x=1.40.

At the bottom, there are controls for BestMatch™, Correlation Mode (Density), Method (Coated), and Mode (Absolute). There are also buttons for Sample 4/4, Proof, MeasureTool, eXact, and Close.

The ColorCert Pressroom Tools contain the new BestMatch guidance function that shows press operators how they can improve the inks' ΔE results on press.

The calculation behind BestMatch is similar to the BestMatch function in the eXact device and can be used with the Correlation Modes **Density** and **Strength** as parameters for ink control.

With BestMatch, press operators quickly see if the result can be improved with a density/strength adjustment using press side parameters (increase/decrease ink film or change the base ink to extender ration) or if the formulation is off or contaminated and needs to be reformulated in the ink room.

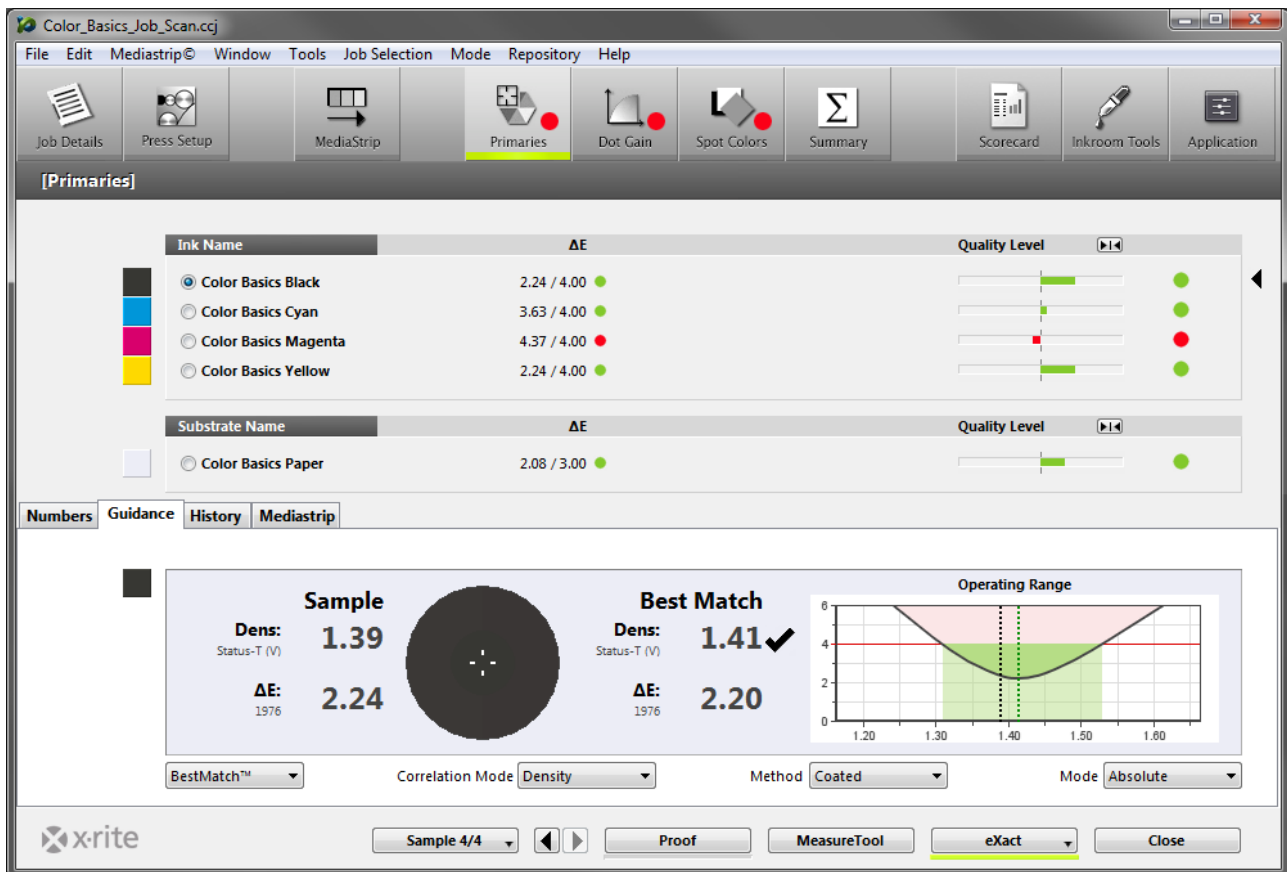
NOTE: BestMatch is a prediction not a fact. Some colors, substrates and formulations will have better accuracy than others. It provides directional information to the press operator.

Requirements

- ColorCert 2.7 (Manager, Pressroom Client or Pressroom Essentials Client)
- Useful samples and information from the ColorCert support website
<http://www.xrite.com/service-support/product-support/formulation-and-qc-software/colorcert-desktop-tools>
 - Color Basics for Pressroom (Rev. B) (physical sample sheet in the eXact box)
 - ColorCert Color Basics Sample Data
 - ColorCert Startup and Configuration Guide

Functionality of the BestMatch guidance

1. In the **ColorCert Chooser** go to **Pressroom Tools** and load a job with measurements.
2. Select **Primaries**.
3. Select **Guidance** in the bottom half of the window.



The screenshot shows the ColorCert software interface. The top menu bar includes File, Edit, Mediastrip, Window, Tools, Job Selection, Mode, Repository, and Help. The main toolbar contains icons for Job Details, Press Setup, Mediastrip, Primaries (selected), Dot Gain, Spot Colors, Summary, Scorecard, Inkroom Tools, and Application. The [Primaries] section displays a table of ink and substrate measurements:

Ink Name	ΔE	Quality Level
<input checked="" type="radio"/> Color Basics Black	2.24 / 4.00	Green
<input type="radio"/> Color Basics Cyan	3.63 / 4.00	Green
<input type="radio"/> Color Basics Magenta	4.37 / 4.00	Red
<input type="radio"/> Color Basics Yellow	2.24 / 4.00	Green

Substrate Name	ΔE	Quality Level
<input type="radio"/> Color Basics Paper	2.08 / 3.00	Green

The bottom section shows the **Guidance** view with the following data:

Sample	Best Match
Dens: 1.39 Status-T (V)	Dens: 1.41 ✓ Status-T (V)
ΔE : 2.24 1976	ΔE : 2.20 1976

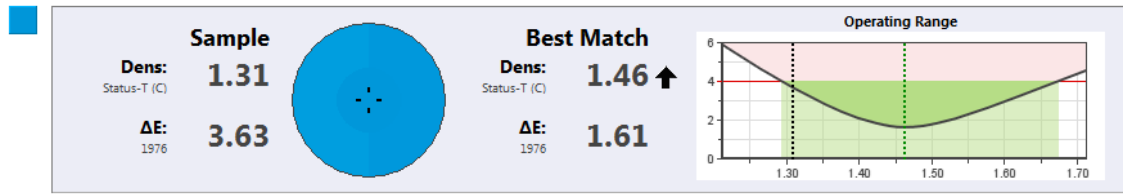
An **Operating Range** graph is shown, plotting Density (1.20 to 1.60) against a quality metric (0 to 6). The graph shows a green shaded area representing the operating range, with a red line at the top and a green line at the bottom. The Best Match value of 1.41 is within the green shaded area.

At the bottom, there are controls for BestMatch™, Correlation Mode (Density), Method (Coated), and Mode (Absolute). The x-rite logo and buttons for Sample 4/4, Proof, MeasureTool, eXact, and Close are also visible.

4. In the bottom of this section, change the first drop down list from **Symbols** to **BestMatch**. This is now active for any further jobs until you change your selection again.
5. Toggle through the inks to show the guidance for the selected ink.

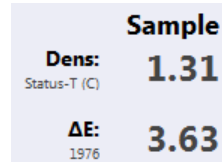
NOTE: To view the BestMatch guidance in a ColorCert job a substrate measurement is required. Jobs without substrate measurements will have Symbols as the default guidance, when changing the drop down list to BestMatch the section will not deliver any results and an empty graph.

How to read the BestMatch guidance



Sample

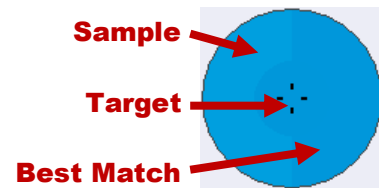
- Density of the last sample measurement including density status and filter as defined in the rules.
- ΔE result compared to the target, including relevant ΔE formula used for this value as defined in the rules.



Visual Circle

(This is not color accurate, but helps to visualize the difference.)

- Left half shows the last sample measurement.
- Right half shows the color of the possible best match.
- Center shows the target color.

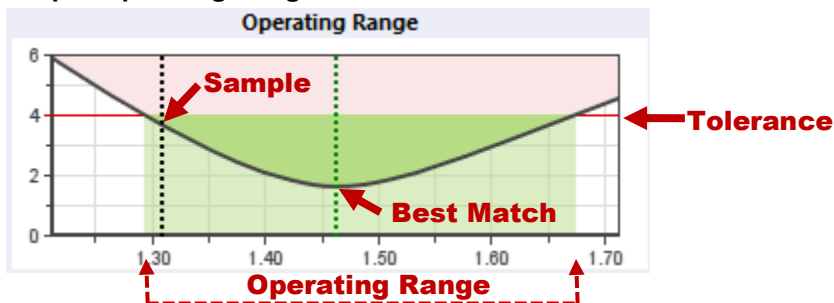


Best Match

- Shows how the density should be changed to improve the result to the best possible ΔE value.
 - ➔ In this case the density needs to be increased to **Dens = 1.46** to achieve the best possible **ΔE₇₆ = 1.61**.



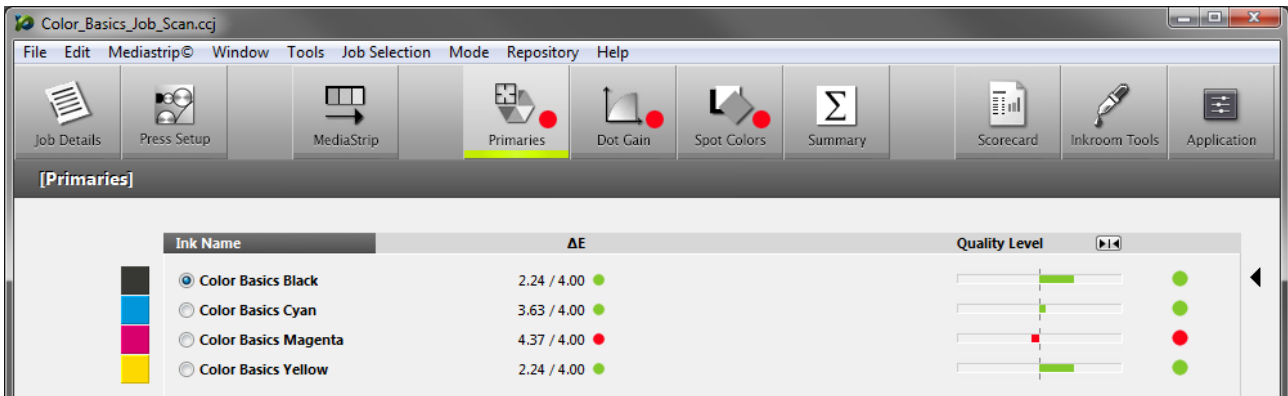
Graph: Operating Range



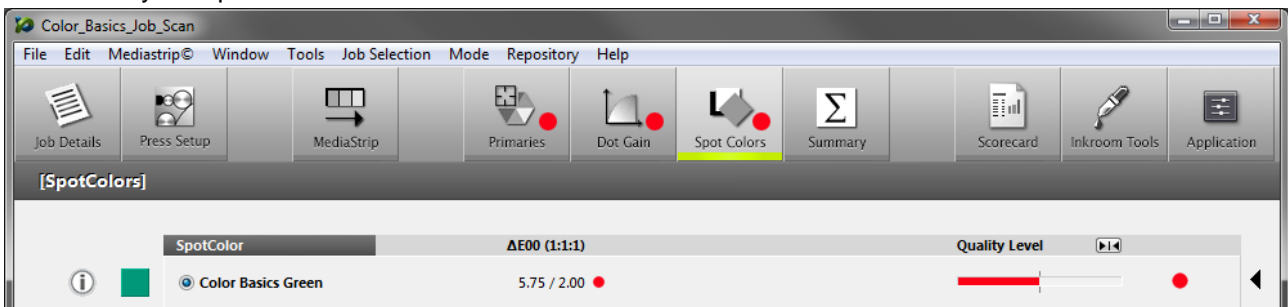
- A curve shows how the ink would change its ΔE result (y-Axis) over density (x-Axis).
- The black dotted line is the density of the last sample measurement **Dens = 1.31** and crosses the curve at **ΔE₇₆ = 3.63**.
- The green dotted line is the density of the possible best match **Dens = 1.46** it crosses the curve at the lowest point at **ΔE₇₆ = 1.61**.
 - ➔ The closer the black dotted line to the green dotted line, the better the ΔE result.
- The red line is the ΔE tolerance defined for this ink.
 - ➔ In this case **ΔE₇₆ = 4**.
- The green area shows the Operating Range, i.e. in what density range this ink would be within the given ΔE tolerance.
 - ➔ In this case from around **Dens = 1.29 to 1.67** the ink would be within the tolerance of **ΔE₇₆ = 4**. This also gives the operator a good impression of how sensitive this ink behaves to process variations.
 - ➔ The smaller the Operating Range the quicker the ink is out of tolerance.

Different examples and their interpretation based on the BestMatch guidance

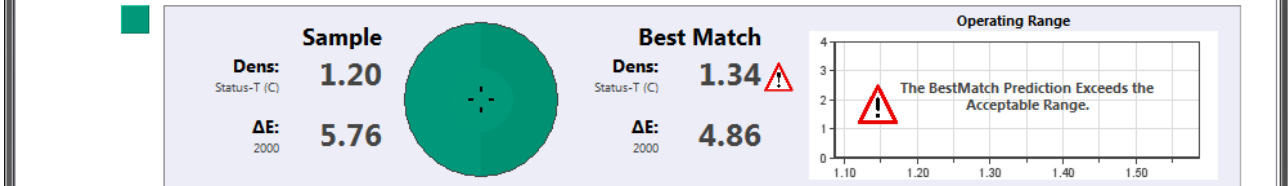
Start checking and adjusting the inks with the highest ΔE result:



Also check your Spot Color ink:

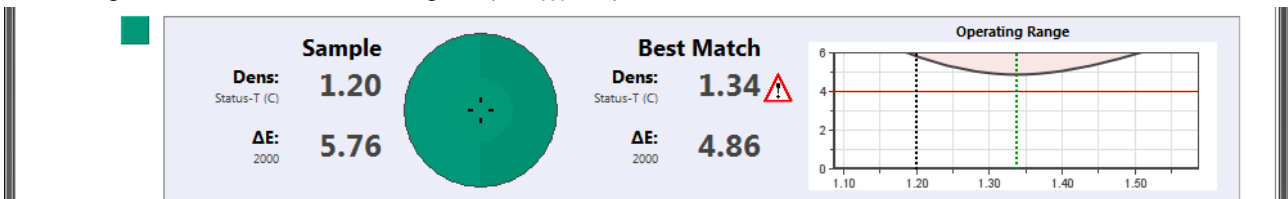


Spot Color Green → Out of tolerance; no chance to improve on press



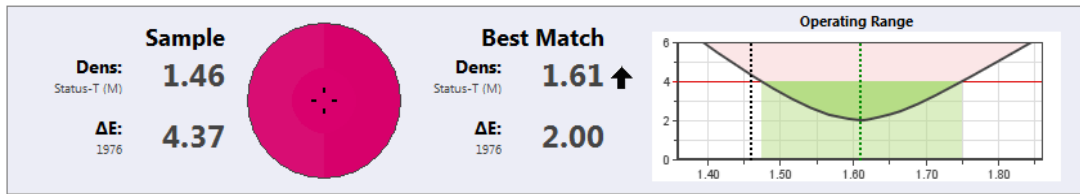
The graph is not showing anything as the best possible result is twice the tolerance away from the target (in this case $\Delta E_{2000} = 2$).

Assuming the tolerance would be higher ($\Delta E_{2000} = 4$) it would look like that:



- This ink has a $\Delta E_{2000} = 5.76$ at the moment and is out of tolerance.
- Even adjusting the density of the ink, the best possible result would be $\Delta E_{2000} = 4.86$ which is still out of tolerance.
- There is nothing the operator can/should do on press to get this ink into tolerance.
- The ink should be reformulated.

Primary Magenta → Out of tolerance but can be improved



- This ink currently has a $\Delta E_{76} = 4.37$ and is out of tolerance.
- The operator can get this ink into tolerance by increasing the density on press.
- The operating range reaches from **Dens = 1.47** to **1.75**. As long as the operator keeps the process variations within this range the ink will be within tolerance.

Primary Cyan → Within tolerance but can still be improved



- This ink currently has a $\Delta E_{76} = 3.63$ and is just within tolerance.
- The operator can improve the result by increasing the density on press.
- The operating range is quite wide, once within tolerance it is not too sensitive to process variations.

Primary Yellow → Within tolerance and small Operating Range



- This ink currently has a $\Delta E_{76} = 2.24$ and is within tolerance.
- The operator can improve the results by slightly decreasing the density.
- **NOTE:** in this case the operating range is very small, slight process variations might bring this ink out of tolerance quickly.

Primary Black → Within tolerance and almost nothing to improve



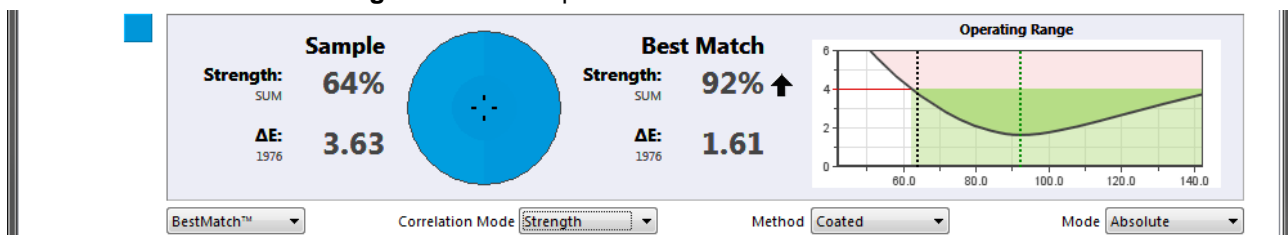
- This ink currently has a $\Delta E_{76} = 2.24$ and is within tolerance.
- There is not much the operator could do to improve the results. Increasing the density by 0.02 would only improve $\Delta E_{76} = 2.20$ and this little density change is probably within usual process variations.
- But the operating range is small and sensitive to higher process variations.

Different options for the BestMatch guidance

Correlation Mode: Density or Strength

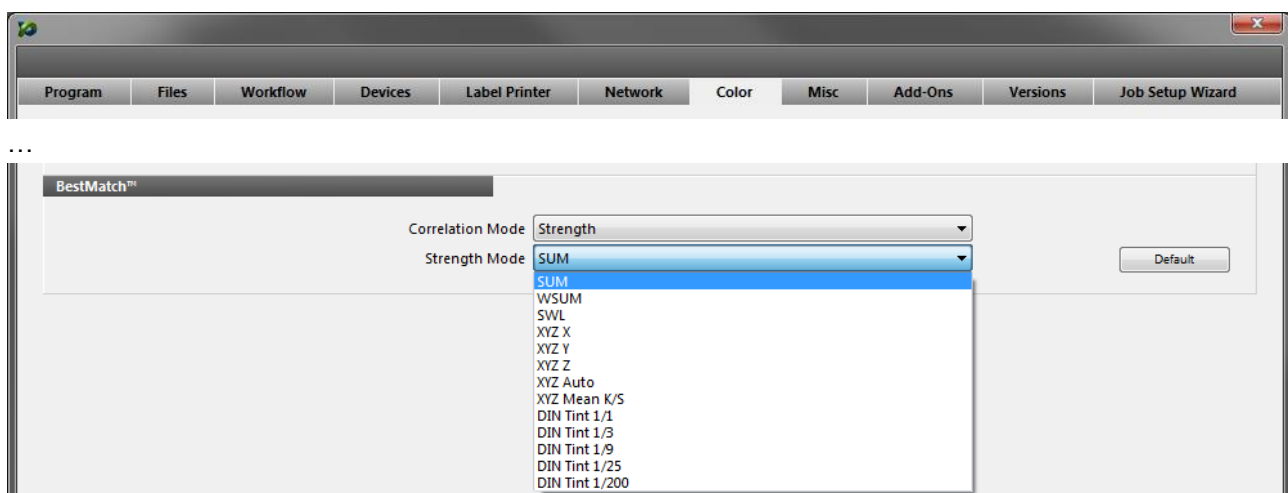
- **Strength** is recommended when using pigmented inks where their absorption/reflection characteristic has a direct relation to the pigment load in the finished ink. It works best if the target is using the same pigments/colorants as the sample and therefore the spectral curves are in direct relation. This metric provides the most useful guidance to operators whether additional base ink or extender will allow them to reach the color.
- **Density** is recommended where the target has no direct correlation with the sample, or the base ink to extender ratio is fixed but the film thickness is adjustable.

If you are not working with density as a parameter to control your inks on press, you can alternatively select the **Correlation Mode = Strength** from the drop down list.



- Instead of density the ink strength will be shown.
- The operating range graph now shows the ΔE results over ink strength.
 - ➔ In this case the ink strength needs to be increased to **Strength = 92%** to achieve the best possible $\Delta E_{76} = 1.61$.

The ColorCert **Preferences** contain two new options for this on the **Color** tab in section **BestMatch**:



- Change the **Correlation Mode** to **Strength**, if you always want to show strength as the default correlation mode in the Pressroom Tools.
- There are different calculation methods for strength. Select the **Strength Mode** that you want to use for the calculation from the drop down list.
 - **SUM**: DIN55986, Apparent Strength, represents the ratio of absorption/reflection data (K/S) of sample and target for the spectrum between 400–700 nm. The result is a percentage value.
 - Strength > 100% ➔ sample is stronger than the target.
 - Strength < 100% ➔ sample is weaker than the target.
 - Strength = 100% ➔ sample and target have the same ink strength.

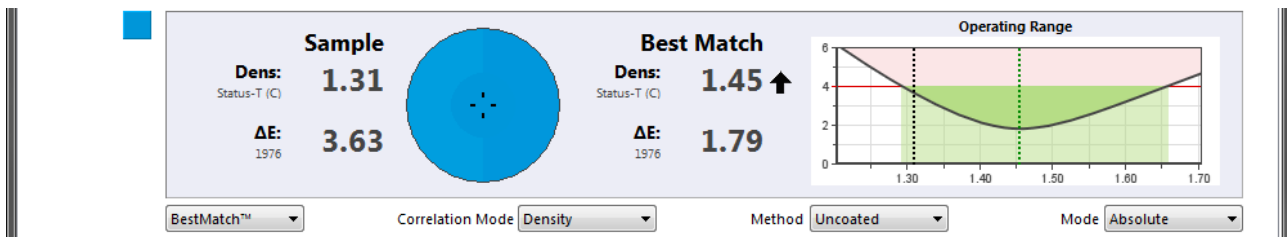
- **WSUM:** Integrated Strength, similar to SUM, but taking the Illuminant/Observer into account. For example if a red ink is evaluated, this method will show a smaller strength difference for D50 illumination than for illuminant A, because changes in red result in a bigger visual difference compared to D50.
- **SWL:** Chromatic Color Strength, similar to SUM, but calculated with K/S data at the single wavelength of maximum absorption of the target. If target and sample have different wavelengths of maximum absorption this method will not deliver correct results.
- **XYZ:** Strength calculation between a target and a sample using the XYZ tristimulus responses. It is recommended to use either **Auto** which automatically selects the relevant response for the specific color of the ink or **Mean** for an average out of the XYZ responses.
- **DIN Tint:** DIN 53235, Strength is calculated for a sample relative to a standard for different apparent strength levels. Used by colorant manufacturers to help determine and adjust for strength differences. Not recommended for press side ink QC, just available for legacy reasons.

NOTE: if the target color is only available as **Lab values**, the Strength Mode in the Pressroom Tools is always **XYZ Auto** no matter which mode was selected in the Preferences. All other Strength Modes require spectral data.

Calculation Method: Coated or Uncoated

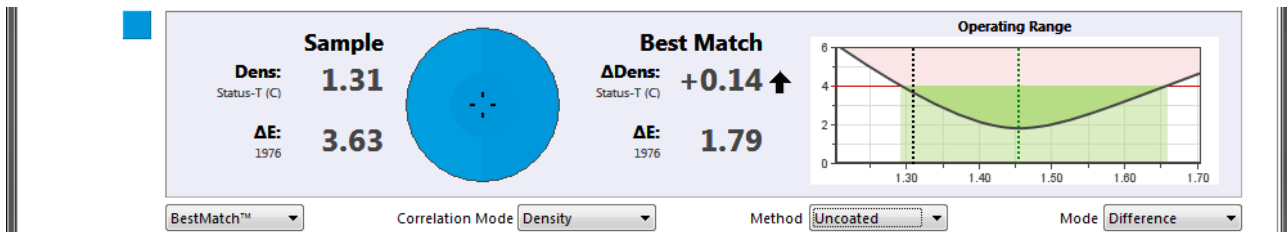
There are two different calculation methods for the BestMatch calculation: Coated or Uncoated. Choose the one that fits your substrate.

- Choose **Coated** for glossy substrates like coated paper or carton, and clear or white film.
- Choose **Uncoated** for rough substrates like uncoated paper, carton or cardboard and other matte finished material.



Display Mode: Absolute or Difference

Instead of the absolute value for BestMatch density or strength you can also show the difference to the sample value. The difference tells the operator what needs to be changed to achieve the best possible ΔE.



- In this case the operator has to increase the density by $\Delta \text{Dens} = +0.14$ to achieve the best possible $\Delta E_{76} = 1.29$.