G7 System Certification Application Data Sheet

Prinect Color Toolbox with Gray Balance optimizer

The IDEAlliance Print Properties Working Group has established a certification process for G7 Systems. In accordance with this process The G7 System Certification Program is designed to evaluate the ability of a candidate system to calibrate a printing device to meet the G7 greyscale definition using four 1-D Curves within the tolerances outlined in this document. All evaluations are based on the parameters of the G7 Specification (draft 2008). The following information is intended to assist producers and consumers in the use of the vendor system as specified for creating the four 1-D Curves.

1. Manufacturer

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2. Product

Prinect Color Toolbox Complete v.3.5 or Greater

Prinect Color Toolbox is a Software Suite consisting of the products Prinect Color Tool with Gray Balance Optimizer, Quality Monitor & Calibration Tool. The Color Tool is the minimum requirement for creating G7 Curve corrections, however the Complete Package is strongly recommended for creating functional curves directly.

3. Manufacturer Instruction Summary

a. Start Calibration Project

i. Prepare preferences in the Process Standards Tab of the Color Toolbox.

ii. Make sure that the appropriate Standard is selected so that measurement verification is accurate. The appropriate Standard is ISO12647-2_2007.

iii. After selecting the Standard select the Paper Type.

iv. Select WB for white backing and BB for Black Backing depending on the surface of the measurement device being used.

b. Measure Run

i. Prepare a calibration/color management test form for printing on your equipment. Place any Industry Standard or Heidelberg specific Color Management Target, such as the IT8.7/4, ECI2002, or PrintOpen Basic 210 and a Verification Target like the ISO12647-7 Strip (if desired) on the Calibration Form.

ii. Print either a Linear or Raw set of plates to Standard Ink Color Values of ISO12647-2.

iii. When form is up to color measure color bars and any other targets to assure that inking is uniform on the sheet.

iv. From the Measure Tab in the Color Toolbox set up the preferred Measurement Device and Measure the appropriate Targets.

c. Analyze Measurements

It is good to verify that the data being used to create the curves is accurate and within the tolerances of the Standard or Specification that was chosen. This step will allow you to make the necessary judgments on whether to continue with the data as is, modify the data, or redo the printing.

i. Open the stored Measurements and compare the results in the Process Standard Window of the Measure Section.

ii. If desired, two or more measurements can be averaged to achieve a more accurate characterization of the press run. To average charts, open one of the Measurement Files and then navigate to the Test Chart Tab and select Calculate Mean Data from the list. Browse to the appropriate folder and select the number of measurements desired and finish by choosing Merge Data.

iii. If there are any anomalies or if the data is erratic then the printing will need to be done again.

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d. Create Temporary Profile

i. If desired save the intermediate measurement data and then go to the Create Tab. There are no adjustments necessary, simply select Calculate and when the file has processed select Save to store the Profile.

e. Create Curve Corrections
(Substrates that conform to GRACoL 2007 Specification)

i. Go to the Special Tab and select Gray Balance Optimization from the list.

ii. With Version 10 or greater the Process Profile that was just created will already be populated in the Process Profile window. In version 3.5 you will need to select the profile that was just created and saved.

iii. In the Reference Profile Window select the GRACoL2006_Coated1v2 Profile.

iv. Select Calculate and Process Curve Corrections will be calculated. With Version 10 the results will be displayed and with Version 3.5 the results can be seen by opening the saved correction data.

v. Select Save Gray Correction Data to a convenient location.

f. Create Curve Corrections – Color Toolbox v.10
(Substrates not in conformance to GRACoL 2007 Specification)

With the Gray Balance Optimizer in the Prinect Color Toolbox Application it is not necessary to use different reference profiles when calibrating substrates that do not conform to GRACoL 7 Specifications.

See following Procedures:

i. The Process Profile that was just created will already be populated in the Process Profile window.

ii. In the Reference Profile Window select the GRACoL2006_Coated1v2 Profile.

iii. Select the Dynamic Process Correction and then Calculate.

iv. Select Save Gray Correction Data at this point.

g. Create Curve Corrections – Color Toolbox v.3.5

(Substrates not in conformance to GRACoL 2007 Specification)

When calibrating substrates that are significantly different than what is described in the GRACoL 7 Specification with Version 3.5 you will need to Edit Reference Data based on the Density of the 3-Color Overprint, Solid Black and the Paper White. This function also allows the user to create custom target values directly if desired.

i. Open the measurement of the Process Sample that you want to calibrate in the measure window of the Toolbox.

ii. From the Measure>Process Standard Tab on the Left Hand side open the CIELAB Color Values section.

iii. Note the L*a*b* Values of the Paper White, Overprint, and Solid Black Measurements.

iv. Open Gray Balance Optimizer and also the reference profile that you want to target.

v. After the reference profile is open go to the Edit Reference Value Tab and select Apply. This will import the target values from the reference profile that is loaded.

vi. Using the noted values from step #3 change the Paper White L* and the Overprint L* in the Grey Correction section and the Paper White L* and Solid Black L* in the Black Correction section.

vii. After changing the L* values in the previous step you will notice that the Density Reference Values for the 25%, 50%, and 75% areas have changed. Using either the GRACoL Graph Paper or the Table found in Annex B of this document (copied from the G7 Graph Paper) Modify the L* Values of the 25%, 50%, and 75% References for CMY and K-only until the Density Values are correct.

viii. Save the results and return to the Calculate Correction Data Tab.

ix. Instead of Selecting a Reference Profile here, select a Reference Data file and Insert the modified Reference File that was just created.

x. Select Calculate and Process Curve Corrections will be calculated and the results displayed.

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h. Import Curve Corrections – when using Heidelberg products

i. In Calibration Manager Create a Process Calibration Curve with the appropriate parameters. Be sure to select a Linear Process Standard Curve.

ii. After the curve is created, highlight it in the window and select Import. From the dropdown select "IT8 File with All Curve Data".

iii. After the data is imported, save the curves and apply them to the next set of Calibration Plates to be printed. With a Heidelberg Workflow these are the actual curves that will be used in production for CTP Plate Calibration. To verify that the curves have worked continue to step J or K.

i. Import Curve Corrections - when using 3rd party solutions

i. In Calibration Toolbox Create a Process Calibration Curve with the appropriate parameters. Be sure to select a Linear Process Standard Curve.

ii. After the curve is created, highlight it in the window and select Import.

iii. From the dropdown select IT8 File with All Measurement Data.

iv. After the data is imported, select the test form (calibration Strip) that is appropriate for your workflow and then select Set Test Form and the curve will populate with the appropriate transfer points.

v. Save the curve and again select the curve from the list.

vi. With the curve highlighted select Print to print the values out in a chart that can be used to transfer the curve to your workflow.

vii. The values that are calculated for third party workflows are identical to the values for the Heidelberg workflow. The extra steps for third party workflows are required to "format" the data at the appropriate entry points for the Calibration program in question. The data is then printed so that it can easily be transferred manually to that product.

j. **Verify Calibration – 2nd Press Run**

  i. Run a set of calibrated plates to the same Color Standards as the first run.

  ii. After assuring that the results are good, measure a verification target. Any target will work, but a target like the ISO12647-7 makes the analysis much easier.

k. **Verify Calibration – Apply Calibration to Linear/Raw Data**

  i. With the newly created curve highlighted in the list select Export.

  ii. When asked select IT8 File with all Curve Data.

  iii. Return to the Color Toolbox and open the Measurement Data from the Linear/Raw Verification Target.

  iv. Select Special and from the drop down list select Convert Measurement Data – Calibration Data.

  v. Browse to the appropriate data Exported from the Calibration Tool and select Apply and then Save the Modified Measurement Data.

l. **Analyze Measurements**

  i. Select the Compare Tab and then select the GRACoL Measurement Values as the Reference.

  ii. Open the Verification Measurements as the Comparison Data, and then analyze the specific attributes of the results.

  iii. Print out reports to analyze the data.

4. Tolerances

IDEAlliance Tolerances

(Using P2P Columns 4 and 5 excluding 0% & 100% - these were the Tolerances used for G7 System Certification)

Metric	Ave	Max
dF*	1.5	3
dL*	1.5	3

Heidelberg Tolerances

Heidelberg's Gray Balance Optimizer passed the G7 System Certification within the described tolerances. The results that you obtain for whatever processes you are using should also be well within the published tolerances for those processes. Because there is such a wide range of different substrates, inks, materials and different processes involved publishing tolerances here would be meaningless.

5. Validation Process

To validate that the G7 calibration process has been successful, a target consisting of at least the patch values listed in Appendix A shall be printed through the calculated correction curves using the same print settings in use when the calibration was calculated.

a. Validating NPDC

To validate NPDC correction, both the K-only scale and the CMY-only scale shall be measured with a densitometer or spectrophotometer and the neutral density (K channel or Visual channel) values recorded for each patch. The densitometer should be zeroed on the substrate, or else the white patch density should be subtracted from itself and all other patches to produce "relative ND" values. The measured results should correspond to the values in the chart in Annex B according to your systems SID Values.

b. Validating Gray Balance

To validate gray balance correction, the CMY-only scale shall be measured with a spectrophotometer At the same points that were measured for HC, HR, and SC, the a* & b* values should correlate to the formula found in Annex C. Tolerances are according to G7 Documentation

Annex A

Target CMYK values

ID	Name	C	M	Y	K
1	A1	100	0	0	60
2	A2	100	0	0	0
3	A3	70	0	0	0
4	A4	30	0	0	0
5	A5	0	100	0	60
6	A6	0	100	0	0
7	A7	0	70	0	0
8	A8	0	30	0	0
9	A9	0	0	100	60
10	A10	0	0	100	0
11	A11	0	0	70	0
12	A12	0	0	30	0
13	A13	100	0	40	0
14	A14	40	100	0	0
15	A15	0	40	100	0
16	A16	0	40	70	40
17	A17	0	70	40	40
18	A18	40	70	0	40
19	A19	40	0	70	40
20	A20	70	40	0	40
21	A21	0	0	0	3
22	A22	0	0	0	10
23	A23	0	0	0	25
24	A24	0	0	0	50
25	A25	0	0	0	75
26	A26	0	0	0	90
27	A27	0	0	0	100
28	B1	100	100	0	60
29	B2	100	100	0	0
30	B3	70	70	0	0
31	B4	30	30	0	0
32	B5	0	100	100	60
33	B6	0	100	100	0
34	B7	0	70	70	0
35	B8	0	30	30	0
36	B9	100	0	100	60
37	B10	100	0	100	0
38	B11	70	0	70	0
39	B12	30	0	30	0
40	B13	100	40	0	0
41	B14	0	100	40	0
42	B15	40	0	100	0
43	B16	10	40	40	0
44	B17	20	70	70	0
45	B18	0	70	70	40
46	B19	70	0	40	40
47	B20	0	0	0	0
48	B21	3.1	2.2	2.2	0
49	B22	10.2	7.4	7.4	0
50	B23	25	19	19	0
51	B24	50	40	40	0
52	B25	75	66	66	0
53	B26	100	100	100	0
54	B27	79	70	70	100

END_DATA

Annex B

300% SID CMY	100% SID K		HC CMY / K		HR CMY / K		SC CMY / K	
1.9	2.2		.25	.22	.54	.50	.98	.92
1.76	2.09		.25	.22	.54	.50	.97	.92
1.67	1.98		.25	.22	.54	.50	.96	.91
1.56	1.88		.25	.22	.54	.50	.94	.90
1.46	1.78		.25	.22	.54	.50	.93	.90
1.37	1.69		.25	.22	.54	.50	.91	.89
1.28	1.60		.25	.22	.54	.50	.89	.88
1.20	1.52		.25	.22	.54	.49	.86	.87
1.13	1.44		.25	.22	.53	.49	.83	.86
1.06	1.36		.25	.22	.52	.49	.81	.85
0.99	1.29		.25	.22	.52	.49	.78	.83
0.93	1.22		.25	.22	.51	.49	.74	.81
0.87	1.16		.25	.22	.49	.48	.71	.79
0.81	1.10		.25	.22	.48	.48	.68	.78
0.76	1.04		.25	.22	.47	.48	.65	.76
0.71	0.99		.25	.22	.46	.47	.62	.73
0.67	0.94		.25	.22	.44	.47	.58	.71
0.63	0.89		.25	.22	.43	.46	.56	.69
0.59	0.84		.24	.22	.41	.45	.52	.67
0.55	0.80		.24	.22	.39	.44	.50	.64

* Table determined from the G7 Fan Graph

Annex C

Determining Target Gray Scale Values from Paper White a* & b* Values.

The formulae for determining Target Gray Balance using a Spectrophotometer and a* - b* values are as follows:

Wanted a* = a*_paper * (100 – Cyan %) / 100

Wanted b* = b*_paper * (100 – Cyan %) / 100

EXAMPLES:

Paper

Paper a* = 1 and Paper b* = -4

Target Values for 25C, 19M, 19Y:

A* = 1* (100-25) / 100 = .75	Target a* = .75
B* = -4* (100 – 25) / 100 = -3	Target b* = -3

Target Values for 50C, 40M, 40Y:

A* = 1* (100-50) / 100 = .50	Target a* = .50
B* = -4* (100 – 50) / 100 = -2	Target b* = -2

Target Values for 75C, 66M, 66Y:

A* = 1* (100-75) / 100 = .25	Target a* = .25
B* = -4* (100 – 75) / 100 = -1	Target b* = -1