Calculating web growth

This topic gives examples for calculating the percentage of web growth from measurements on press sheets or traditional page-shifts.

The standard process for determining web growth compensation parameters is to print press sheets with no compensation, and then measure the discrepancies between the separations at different points on the surface. The growth percentage for one separation relative to another is then calculated by adding the discrepancy at the farthest left pair of marks, to the discrepancy at the farthest right pair of marks, and dividing by the distance between the pairs.

Once calculated, the percentages are entered into the web growth profile file. Prinergy uses the percentages from the web growth profile in an algorithm to compensate for web growth.

Example 1: Measuring the displacements from the yellow separation across a grid

Table 1 is a table of measurements from a press sheet of grids printed with the ink order KCMY. Each column of numbers corresponds to the vertical grid line at a particular horizontal position. (This is only an example. In reality, a grid would contain far more lines.) Yellow is the last ink down, so it is the base separation against which other separations are measured.

Table 1: Displacements from the yellow separation across a grid

	Distance in mm Negative numbers indicate distances to the left. Non-negative numbers indicate distances to the right.								Page Growth
X	-886.8	-584.0	-252.0	-12.7	12.7	315.5	584.0	886.8	N/A
K-Y	-1.38	-.82	-.36	.1	.13	.64	.95	1.40	(1.38 + 1.40)/(2 x 886.8) = .157%
C-Y	-1.04	-.66	-.36	.10	.10	.30	.46	.78	(1.04 + .78)/(2 x 886.8) = .103%
M-Y	-.52	-.30	-.08	.10	.08	.12	.23	.40	(.52 + .40)/(2 x 886.8) = .052%

X measures the horizontal distance (across the web) of the vertical grid line from the horizontal center of the sheet. The first column corresponds to the left-most grid line, which is 886.8 mm to the left of the center. The last column corresponds to the right-most grid line, which is 886.8 mm to the right of the center.

The figures in row K-Y measure the displacement from the black separation to the yellow separation for corresponding grid lines.

The figure in row C-Y measure the displacement from the cyan separation to the yellow separation.

The figures in row M-Y measure the displacement from the magenta separation to the yellow separation.

Looking at the K-Y row in detail, the -1.38 in the column where X is -886.8 indicates the black separation is 1.38 mm to the left of the yellow separation at the left edge of the sheet. The 1.40 mm in the column where X is 886.8 indicates the black separation is 1.40 mm to the right of the yellow separation at the right edge of the sheet. Thus, the black separation is larger than the yellow (by about 1.38 + 1.40 = 2.72 mm). This is expected because the black was printed before the yellow, and the paper grew while traveling from the black ink unit to the yellow ink unit. The growth of the black separation, relative to the yellow, is (1.38 + 1.40) / (2 x 886.8) = . 157%, as shown in the Page Growth column at the right of the table.

Similarly, for the C-Y and M-Y rows, the growth of these separations relative to yellow is calculated in the same way and shown at the right of the table. The growth of the cyan is about twice that of the magenta, while the growth of the black is about three times that of the magenta. This is normal for equally spaced ink units.

Note: The only data used to compute the growth was the displacements at the outer edges.

After you calculate web growth, you enter the percentages into the web growth profile for the press and paper to which this growth applies. You must enter values for both the upper and lower surfaces in the same web growth profile. Prinergy takes the percentages from the web growth profile and uses an algorithm to compensate for the web growth. The numbers in the web growth profile should decrease from the first ink tower (first down, so largest growth) to the last ink tower (last down, so no growth).

Example of a web growth profile

Example of a tower-color file

Note: Only horizontal percentages appear in the file. If a percentage is missing, as it is for all the y (along-the-web) parameters, it is assumed to be zero. The growth for tower 4 (corresponding to yellow, according to the `TowerColorMap.txt` file) could therefore be left out, given that it is zero. For true web growth, the percentage growth values for the lower surface (side=L) are the same as for the upper surface (side=U) to avoid the paper curling.

Example 2: Measuring page shifts

In this example, the page shifts used to compensate for web growth are specified instead of grid measurements, as might appear in a table in the job jacket when traditional compensation methods are used. In this example, the ink order is KCMY, measurements are in inches, the imposition is four across, and pages are 12.5 inches wide.

Table 2: Page shifts to compensate for web growth

Page	Left Outer	Left Inner	Right Inner	Right Outer
K	0.005	0.002	-0.002	-0.005
C	0.003	0.001	-0.001	-0.003
M	-	-	-	-

| Y | -0.004 | -0.002 | 0.002 | 0.004 |

The left outer black page is moved right by .005 in. towards the center. The right outer page is moved left by .005 in. towards the center. The yellow pages are moved out. The magenta separation is not adjusted.

While Table 1 specified the displacement on press, Table 2 specifies the compensation to be applied. In Table 2, magenta is used as the base separation. However, the web growth profile always uses the last ink down as the base separation.

Table 3 below reexpresses the data of Table 2 in the format of Table 1. Consider the left outer page: the black is shifted .005 inches to the right, and the yellow .004 to the left. As a result, relative to the yellow, the black page is shifted .009 inches to the right. Because Table 2 indicates how much to shift each page to align the centers of the pages, and the pages are 12.5 inches wide, the page center of the left outer page is at 1.5 x 12.5 inches = 18.75 inches left of the signature center. The displacement of the black relative to the yellow at -18.75 inches from the center, then, is -.009 mm.

Table 3: Displacements from the yellow separation at page centers

	Distance in inches Negative numbers indicate distances to the left. Non-negative numbers indicate distances to the right.				Page Growth
X	-18.75	-6.25	6.25	18.75	N/A
K-Y	-.009	-.004	.004	.009	(.009 + .009) / (2 x 18.75) = .048%
C-Y	-.007	-.003	.003	.007	(.007 + .007) / (2 x 18.75) = .037%
M-Y	-.004	-.002	.002	.004	(.004 + .004) / (2 x 18.75) = .021%

To compute the growth, we again use only data for the outer pages. The displacements are accurate to only one significant figure, so there's no need to use more than two figures for the growth percentage.