

Examples: nonlinear web growth profiles

In cases where it is not practical to assume that the web growth is linear across the paper, a nonlinear web growth profile can be created to capture the actual displacements from the base separation.

This topic provides nonlinear web growth profile examples for distortions occurring:

- Across the web
- Across and around the drum

Example 1: nonlinear web growth profile-across the web

This web growth profile example uses the same displacement measurements as in Table 1: Displacements from the yellow separation across a grid. It uses plate tower 1 for the black separation, plate tower 2 for the cyan separation, and plate tower 3 for the magenta separation.

```

<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE profile SYSTEM "WebGrowthProfile.dtd">
<profile>
<measurePosition x = "1" y = "1" unit = "mm"/>
<measureShift x = "1" y = "1" unit = "mm"/>
<plate tower="1" side="U">
<xshift x=
  "-886.8" dx= "-1.38" />
<xshift x=
  "-584.0" dx= "-.82" />
<xshift x=
  "-252.0" dx= "-.36" />
<xshift x=
  "-12.7" dx= ".10" />
<xshift x=
  "12.7" dx= ".13" />
<xshift x=
  "315.5" dx= ".64" />
<xshift x=
  "584.0" dx= ".95" />
<xshift x=
  "886.8" dx= "1.40" />
</plate>

<plate tower="2" side="U">
<xshift x=
  "-886.8" dx= "-1.04" />
<xshift x=
  "-584.0" dx= "-.66" />
<xshift x=
  "-252.0" dx= "-.36" />
<xshift x=
  "-12.7" dx= ".10" />
<xshift x=
  "12.7" dx= ".10" />
<xshift x=
  "315.5" dx= ".30" />
<xshift x=
  "584.0" dx= ".46" />
<xshift x=
  "886.8" dx= ".78" />
</plate>

<plate tower="3" side="U">
<xshift x=
  "-886.8" dx= "-.52" />
<xshift x=
  "-584.0" dx= "-.30" />
<xshift x= "-252.0" dx= "-.08" />
<xshift x= "-12.7" dx= ".10" />
<xshift x= "12.7" dx= ".08" />
<xshift x= "315.5" dx= ".12" />
<xshift x= "584.0" dx= ".23" />
<xshift x= "886.8" dx= ".40" />
</plate>
</profile>

```

Note that the xshift element has two attributes: x, which is the horizontal distance across the web; and dx, which is the displacement from the base separation.

The profile also specifies how the measurements are spaced along the plate with the measurePosition element, and the measureShift element specifies the units used for the displacement measurements themselves.

Example 2: nonlinear web growth profile (across and around the drum)

In this example, measurements are made across the drum (on the x axis), and around the drum (on the y axis). Across the drum, measurements are made every 8 inches and displacements are measured in 1-millimeter increments:

```
< measurePosition x = "8" unit = "inch" />
```

```
<measureShift x = "1" unit = "mm" />
```

The x origin (the across-the-drum measurement) is at the centre of the plate, and so the left-hand x coordinates are negative, and the right-hand coordinates are positive. If the plate is 44" wide, and the first measurement is 2" in from the left edge, this left-most x coordinate will be $(44/2 - 2) / 8 = -2.5$. Because the measurements are spaced by measurePosition, they will have the x coordinates -2.5, -1.5, -0.5, 0.5, 1.5, and 2.5. The displacement, dx, is simply the measured difference between a feature position in the base separation and the "current" separation.

The y origin (the around-the-drum measurement) is at the plate's leading edge, and so the y coordinates start from 0 and are always positive, but otherwise, the concept is the same as the across-the-drum measurements. The yshift element has two attributes, y and dy, which specify the y offset and the displacement in the y direction respectively. An example web growth profile with nonlinear web growth in both the x and y directions is shown below:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE profile SYSTEM "WebGrowthProfile.dtd">

<profile>
<measurePosition x = "8" y = "2" unit = "inch" />
<measureShift x = "1" y = "1" unit = "mm" />
<plate tower="1" side="U">
<xshift x= "-2.5" dx= "-1.584" />
<xshift x= "-1.5" dx= "-.720" />
<xshift x= "-.5" dx= "-1.544" />
<xshift x= ".5" dx= ".288" />
<xshift x= "1.5" dx= "1.288" />
<xshift x= "2.5" dx= "1.578" />
<yshift y= ".5" dy= "-3.288" />
<yshift y= "1.5" dy= "0" />
<yshift y= "2.5" dy= "-2.578" />
<yshift y= "3.5" dy= "-4" />
<yshift y= "4.5" dy= "-2" />
<yshift y= "5.5" dy= "0" />
<yshift y= "6.5" dy= "-2" />
<yshift y= "7.5" dy= "0" />
</plate>
</profile>
```