

# 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>
```