

means the length of one color image compared to the length of another color image. The concern is not that the image has enlarged or contracted overall. Few jobs will have margins so critical that the image length cannot increase by, say, .012" without causing problems. RPL and fanout are concerned with relative dimensional changes, in other words unequal changes, among color images. Here, a length difference of .012" between, say, the magenta and cyan images can mean a very serious register problem.

RPW (or fanout) refers to variations in size of the different colors as measured in the across-the-web direction. RPW is the result of the web growing in the side-to-side direction as it goes through the units. An image will differ in width from those put down after it while the web is increasing in width. One of the characteristics of RPW is that the amount of variation is small and highly consistent. The *GATF Web Offset Final Report* indicates that $\pm .001''$ on a $32\frac{1}{2}''$ form is the normal range of variation for as many as 50 consecutive signatures.

RPW and RPL are two distinct problems. RPW (width) is paper-related, while RPL (length) seems to be press-related. RPW changes occur between units. A change on the top of the web will be matched by the same change on the bottom of the web. RPL changes appear to occur within the printing couple. For example, the top magenta can print long (relative to the top black image) on one impression, while the bottom magenta is printing short—and the relationship can completely reverse

on the very next impression. And the range of variation encountered from signature to signature in RPL is much greater than that associated with RPW. Perhaps most important from the pressman's point of view is that fanout can be controlled, while the same cannot be said of RPL.

Because RPL refers to variations in image size measured in the lengthwise direction of the web, one might think the natural cause to be paper stretch as the web goes through the units. Stretch would cause the first down color to print longer than succeeding colors, with the last down color printing the shortest. As a matter of fact, stretch seems to be a minor factor in creating variations in RPL, if it is a factor at all. It is not uncommon for the first- and second-down images to show contraction while the third is showing growth.

As stated above, the source of variation in RPL seems to lie within the printing couples, although speed settings have a strong influence. The GATF studies show that variations in RPL on the top of the web are usually significantly greater than those occurring on the web bottom. The cause of this is not known. It is known that the tension setting at infeed metering will sometimes affect RPL. Press speed also seems to have an effect, but both effects are unpredictable.

The amount of variation in RPL can change radically from web top to web bottom, from one impression to the next, or from one unit to the next. Thus, even if the causes of the problem were well understood, the means for controlling it would not be simple.