

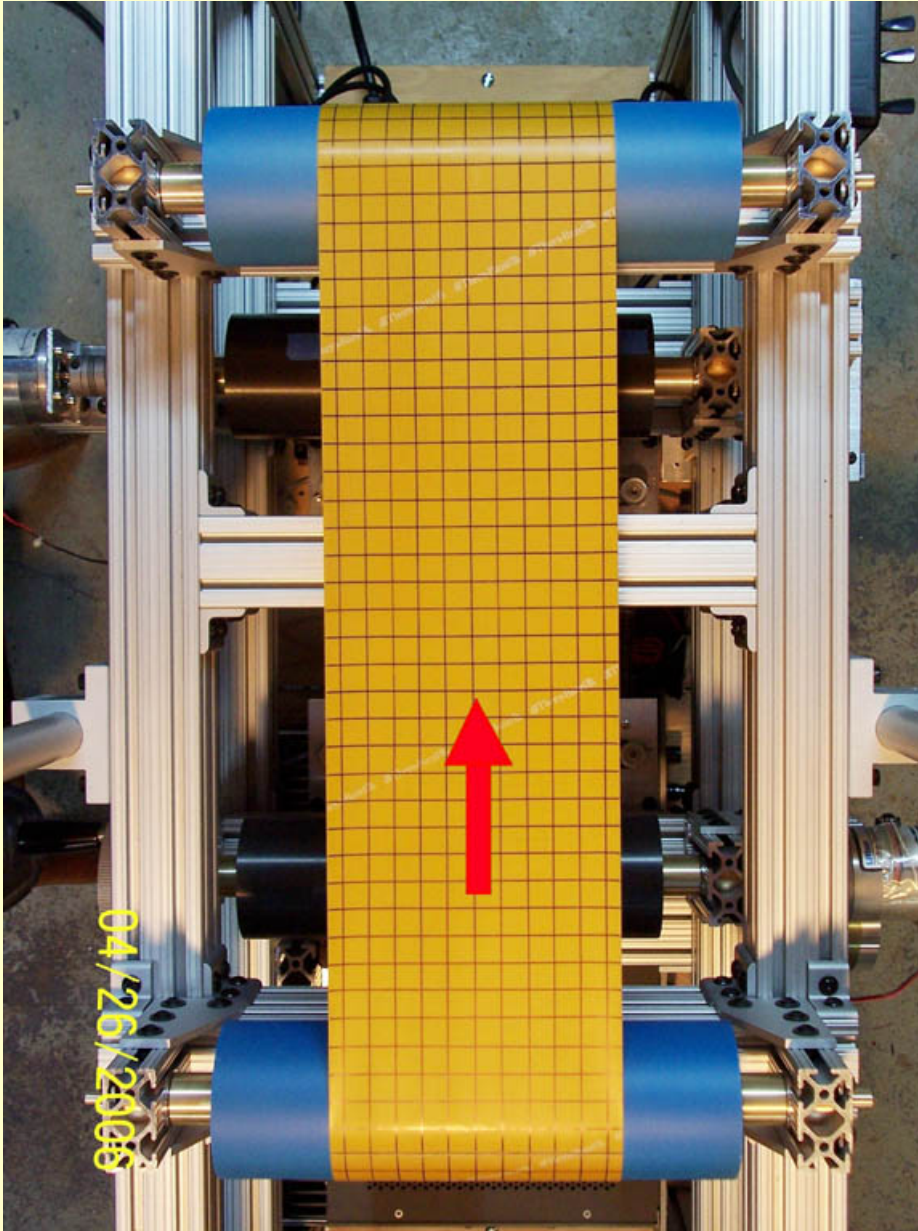
The normal entry rule

A web entering onto a roller will align its direction of travel perpendicular to the roller axis. If it is not initially perpendicular, it will travel laterally on the roller at a rate proportional to the tangent of the angle between the web and the roller until it reaches the perpendicular condition.

There is no evidence that any of the guiding companies in the U. S. knew of this rule prior to 1960. The first published mention of it is in a book by Donald Cambell in 1958. I independently rediscovered it in 1960 while working at Fife Corporation.

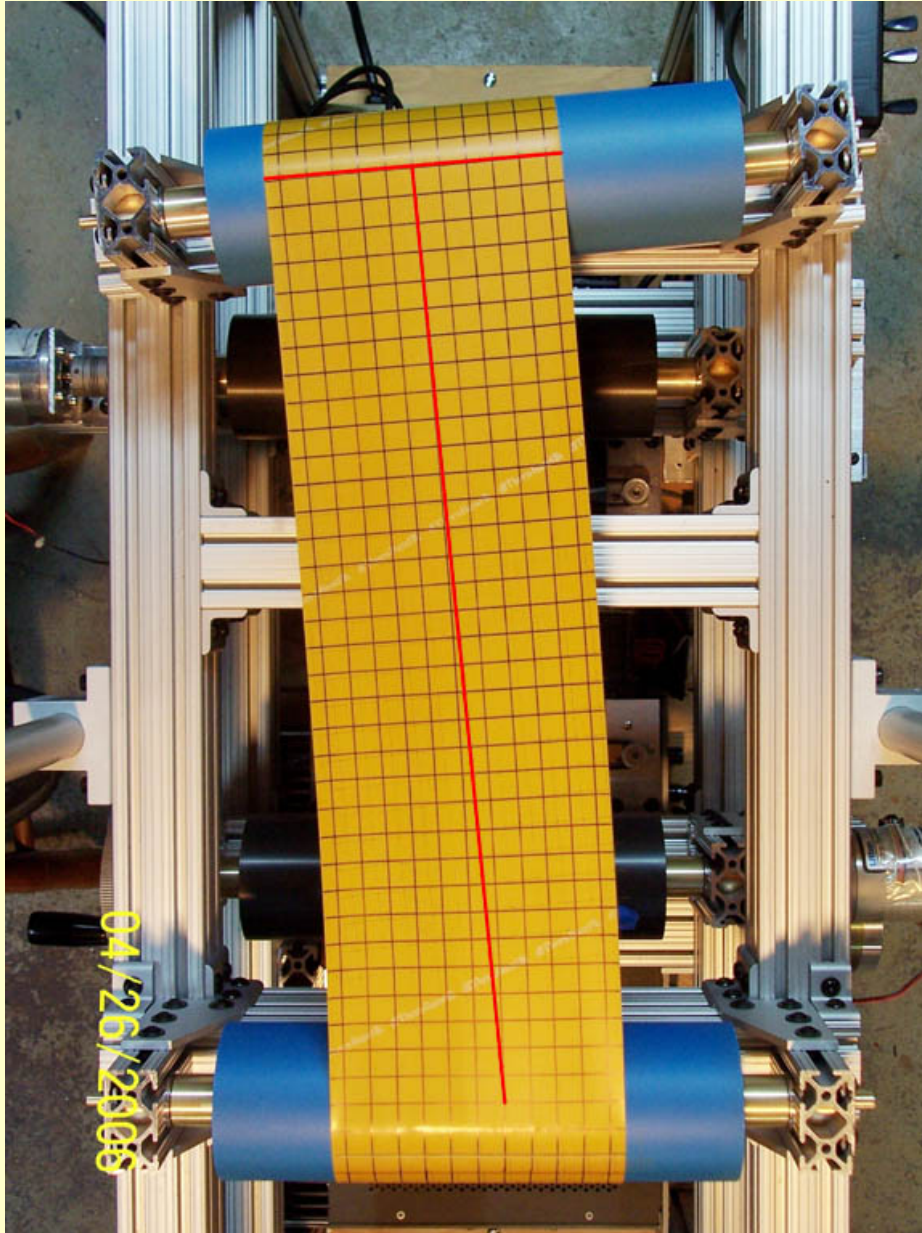
The normal entry rule for real webs

- The next slides illustrate the beam behavior of a web, first described and analyzed in Shelton's 1968 dissertation.
- You will see that the web bends like a beam under tension.
- The web is latex so that the strains can be made large enough to be visible with the unaided eye.



Initial condition

- Rollers aligned.
- Tension low (about 0.5 Lb).
- Markings in a square grid pattern were applied to the web when it was relaxed.
- Each vertical line may be thought of as a particle path.

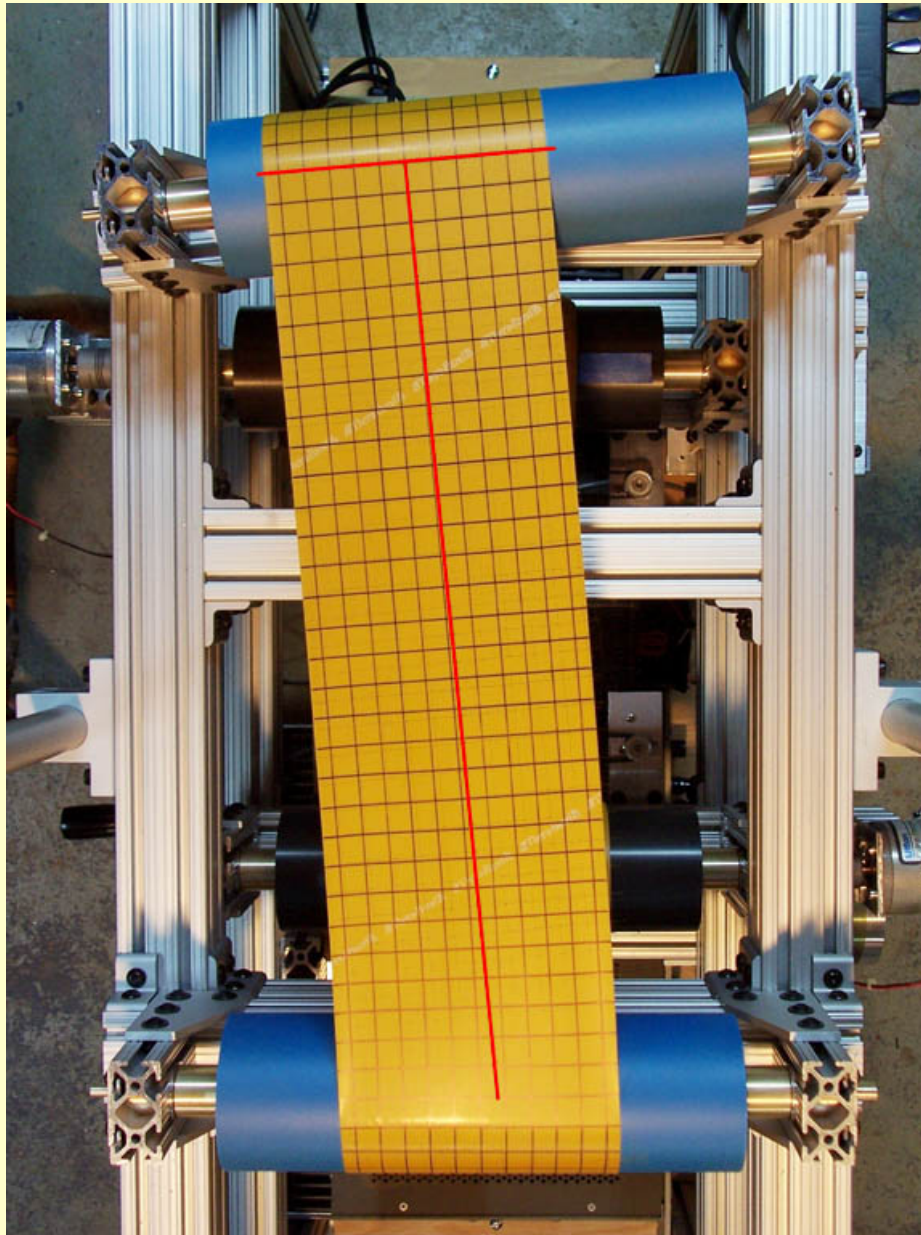


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The roller is pivoted

- The downstream roller is misaligned 5 degrees.
- The web has reached steady state.
- Straight and mutually perpendicular red lines mark:
 - The web centerline if web were not curved
 - The roller axis
- Note that even though the web is curved near the upstream roller, it is perpendicular to the downstream roller axis.



Effect of increasing tension

- Increasing the tension to 3.7 Lb reduces the curvature.
- The web behaves more like a flexible string.