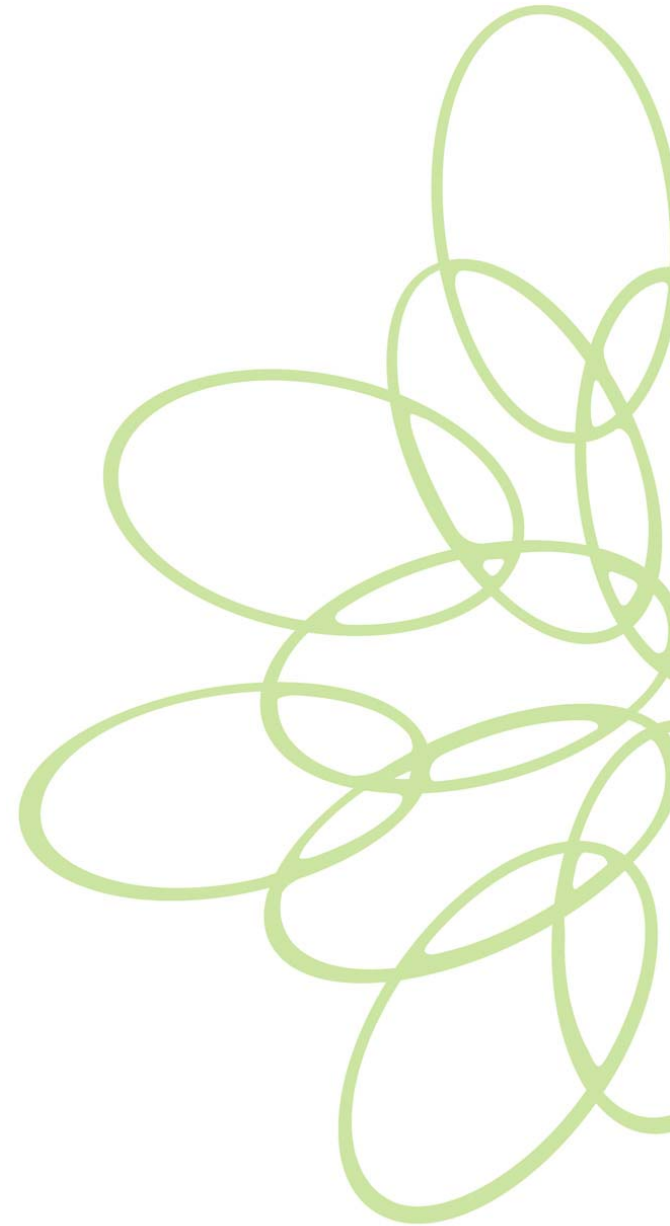


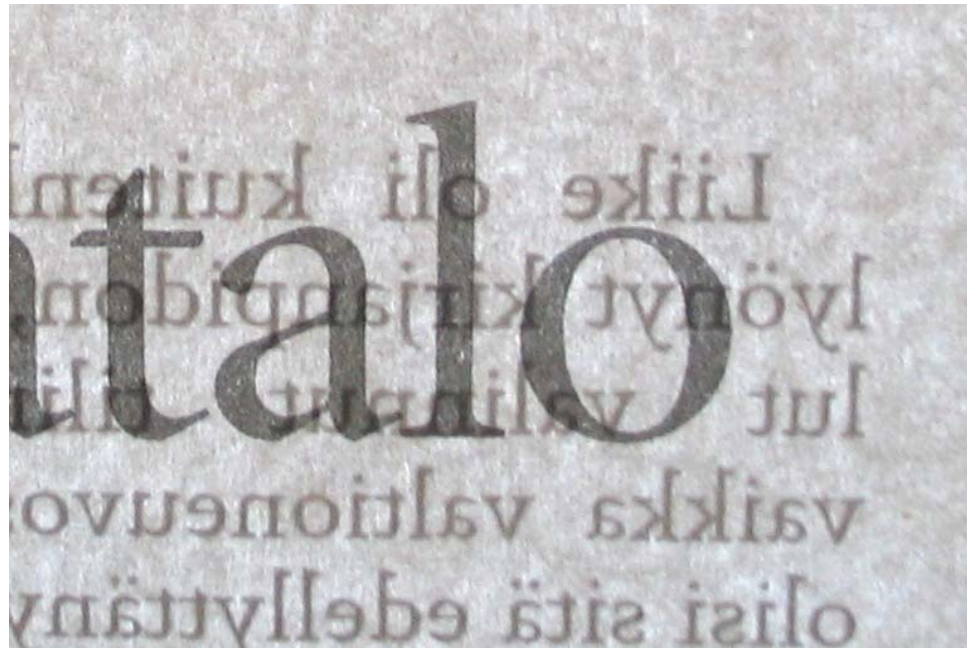
Print-through - how to measure it?

Kari Niemi



Print Through

- Unwanted appearance of a printed image on the reverse side of the print
- Print Through = Show Through + Strike Through

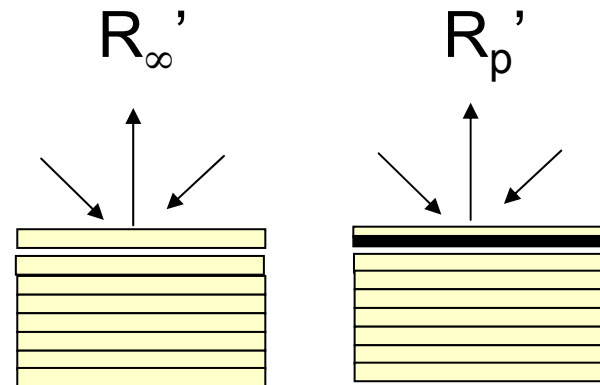


Reflectance measurements with spectrophotometer



- Spectrophotometer (ISO 2469)
 - d/0° geometry
 - 30 mm test area
 - Gloss trap
 - Calibration accordingly to ISO standards
 - UV adjustment

$$PT = \text{Log} \frac{R_{\infty}'}{R_p'}$$



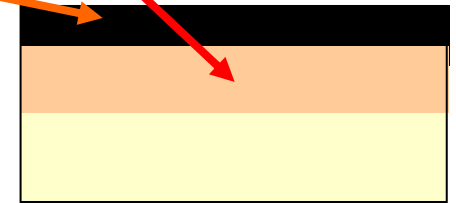
Print through components

Print Through = Show Through + Strike Through

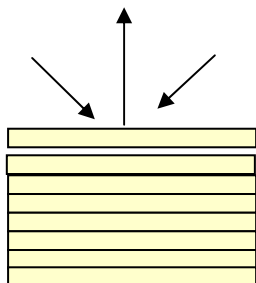
Strike Through: pigment penetration + vehicle penetration

$$PT = PT_{st} + PT_p + PT_v$$

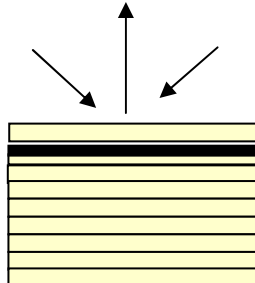
$$PT = \text{Log} \frac{R_{\infty'}}{R_p'} = \text{Log} \frac{R_{\infty'}}{R_x} + \text{Log} \frac{R_x}{R_{pp}'} + \text{Log} \frac{R_{pp}'}{R_p'}$$



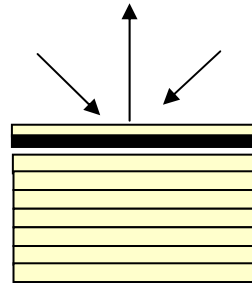
R_{∞}'



R_x



R_p', R_{pp}'



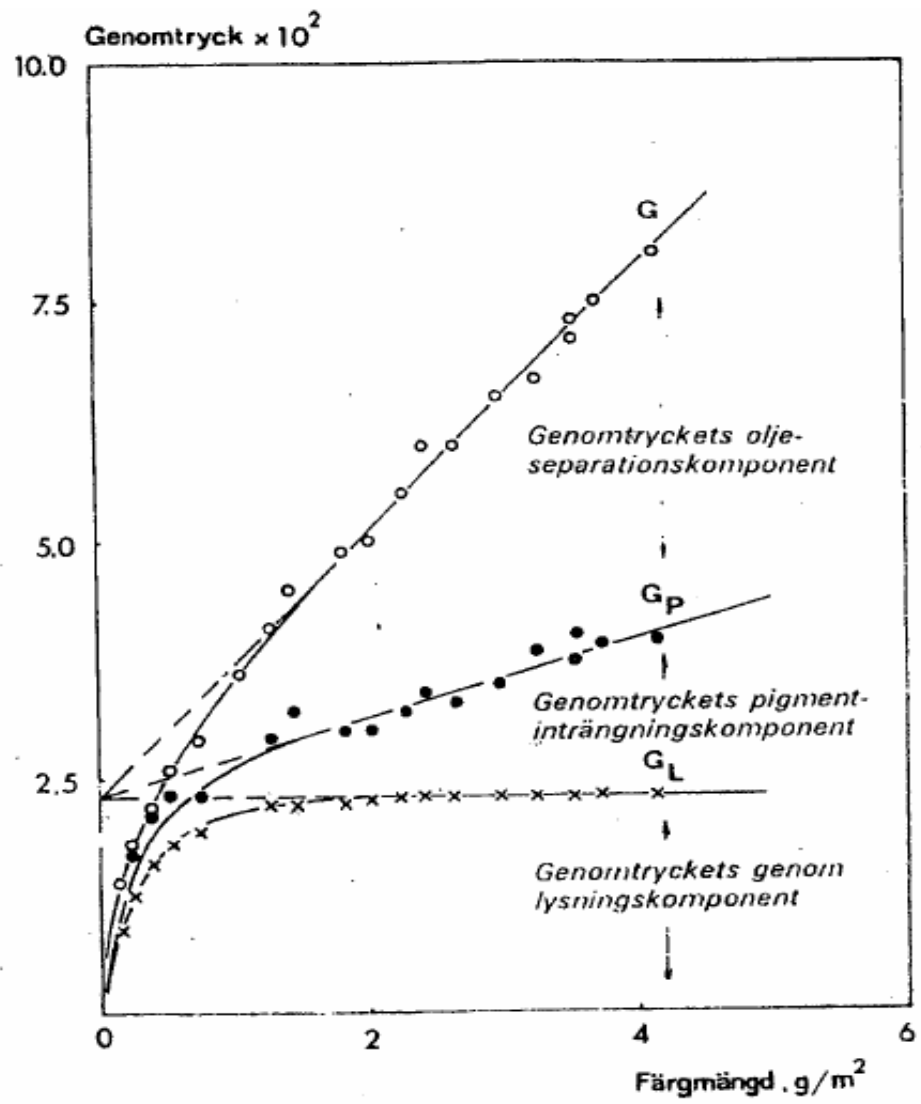


Fig. 5. Genomtrycket, genomtryckets pigmentdel och genomlysningsskomponenten som funktioner av färgmängden på papperet.

Measurement of color difference with spectrophotometer

- Color difference of unprinted sample (u) and backside of the solid print (b) in CIE Lab color space



$$PT = \sqrt{[(L_b - L_u)^2 + (a_b - a_u)^2 + (b_b - b_u)^2]}$$

Print through variation measured with scanner

- The variation of print through can be analyzed from scanned images.
- Possibilities to more sophisticated analysis with Image Analysis software





New methods are needed

- New method should have better correlation with visual perception
- We should know better the effect of:
 - different color
 - print through level and variation
 - small dots (number/unit area, size)on visual perception