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## Short timescale wetting and penetration on paper

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In this study penetration and spreading of printing ink on paper in High Speed Inkjet (HSI) printing is investigated. Printing ink penetration is reducing color density and spreading of the ink on the surface is crucial for development of print density. Three measurement techniques are evaluated: Ultrasonic liquid penetration measurement (ULP), contact angle measurement (CA) and scanning absorptometry (SA). With each of these techniques liquid penetration as well as surface wetting can be measured. For our studies we are using model liquids with defined surface tension, viscosity and polarity in terms of Hansen solubility parameters. A quantitative comparison of these three measurement techniques is carried out. Two parameters indicating a combined parameter for liquid penetration and wetting are introduced. The slope of the contact angle over time and a contact angle calculated from SA by rescaling according to the Lucas Washburn equation. These two parameters are correlated, supporting the idea that they are indeed capturing a combination of liquid penetration and wetting.

Furthermore, we want to investigate parameters, which are responsible for the absorption behaviour and how strongly they affect it. Starting with looking at the influence of viscosity and surface tension. For the investigation of these properties in the HSI printing process an industrial print head is used. We introduce the Ohnesorge –Number and Reynolds-Number to take advantage of the whole operation window of the print head and develop liquids, which are at the very limit of (good) jet-ability, in terms of surface tension and viscosity. Fullprints are analysed with a print-through method and a single droplet evaluation is done with an image analysis program. To close the circle these liquids are also measured with the ULP, SA and Contact angle measurement (CA also using picoliter-droplets) to see how the print results correlate with the measurement results.

### References

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