

A unique tool for digital printing research – case studies of toner transfer

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Why we need research tool?


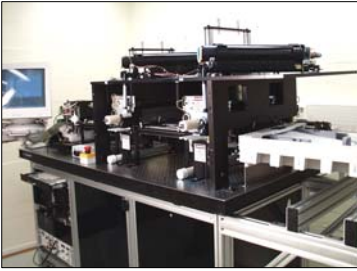
- Electrophotography is the major digital printing method, development of presses and consumables is fast
- Production presses are made for production, their applicability for research is limited:
 - Black-box design
 - Limited amount of adjustable parameters
 - Connections between parameters
 - » Need for equipment, in which operator can have access for all parameters




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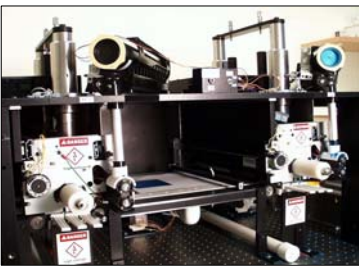
 **KCL Duplo**
- What is it?

- tailor-made sheet fed two-color simplex printer
- process speed 9,6 m/min (160 mm/s)
- LED array
- resolution 600 dpi
- dual component dry toner
- direct corona transfer




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 **Special features – what is unique?**




- open structure - easy sampling between different process steps
- independent adjustment of different process parameters
- from laboratory sheets to commercial papers and to other substrates
- humidity and temperature controlled
- does not support variable data




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 What can be varied?


- process speed
- transfer voltage
- paper pre-conditioning (duplex simulation)
- de-tack voltage
- fuser temperature
- toner concentration
- photoconductor exposure
- toner - carrier



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 Case 1:
Are there differences in paper's operating windows?

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Approach

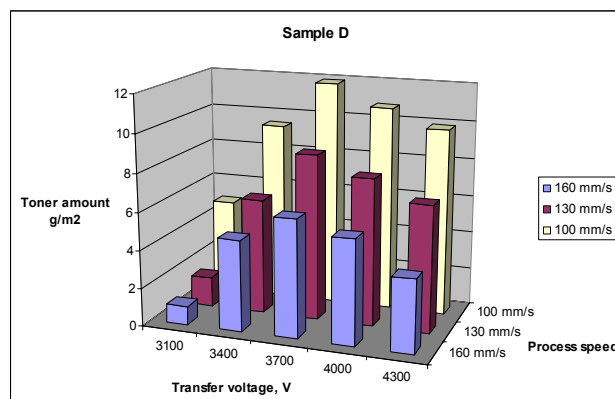
- Several commercial papers were selected for the trial
- Transfer voltage and printing speed were varied
 - 25 printed and fused samples => print density
 - 25 unfused samples => toner amount

Sample	
D	80 g/m ² uncoated copy paper
E	80 g/m ² uncoated copy paper
G	75 g/m ² uncoated copy paper



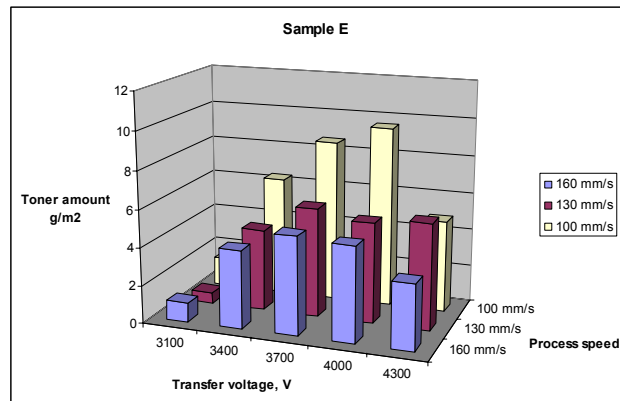
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Transferred toner amount

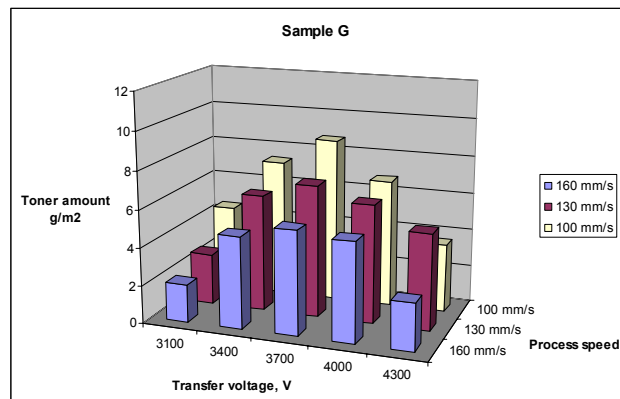


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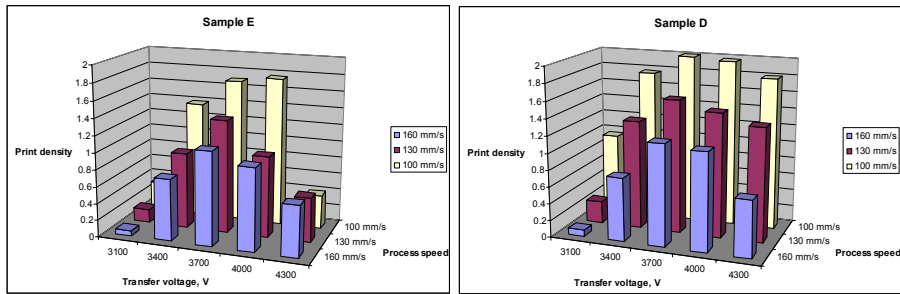
Transferred toner amount



Transferred toner amount



Comparison of print density



➤ Paper D has wider operating window




Why to care?




Cloudiness at low voltages, more defined artifacts at high voltages






Case 2: Do toner particles move laterally and thus distribute unevenly?



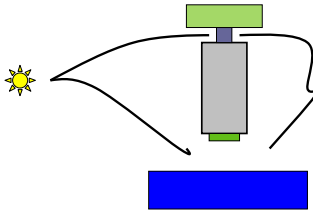



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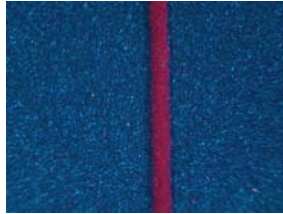
Approach: Off-line imaging

- Printer stopped at a suitable moment
- Drum cartridge removed from the engine
- Camera body + stereo microscope
- Lighting from two sides

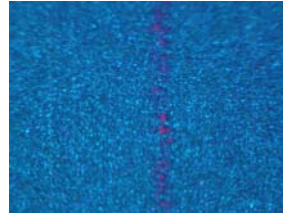





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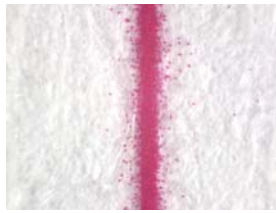
Evolution of thin ($\sim 50 \mu\text{m}$) line



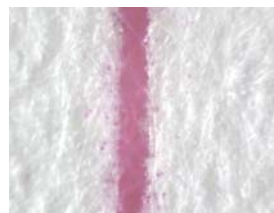
Drum before transfer



Drum after transfer



Paper after transfer



Paper after fusing



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More cases?


- Influence of paper humidity
- Fusing latitude
- Silicone oil transfer
- Comparative studies of different toners
- ... You mention it!



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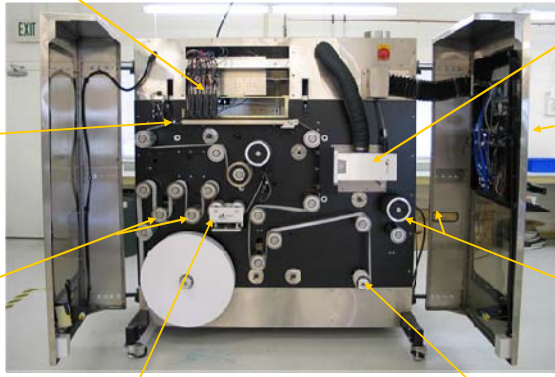
Next tool?




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iTi DWP inkjet press

Xaar OmniDot 760 printheads x 4



- High resolution quadrature output encoder
- Tension control dancers
- Ultrasonic web guide
- Dryer
- Touch screen panel
- Nip roller & external feed rewind option
- Rewind roll



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