IGT Testing Systems
Kees van Middelkoop

In-house testing of inks for on-press and end-use performance

24 - 27 September • Brussels
LABELEXPO EUROPE 2019
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Introduction

- IGT Testing Systems [The Netherlands – USA – Singapore – Japan]
  - 40 representatives world wide
- Development – Manufacturing – Sales
  - Printability testing Equipment
  - Tack Testing Instruments
- Used in the industries
  - Paper
  - Printing
  - Ink
- Research

IGT Testing Systems

- Since 1939 involved in paper, ink and print (80 years)
- Specialist in printability
- Dynamic process simulation using ink and substrate

Content

- Pre-press ink proofing system
- Assessing rub and environmental resistance
- Setting up a quality assurance system

Print Preparation

- Determine:
  - Purpose of test
  - Determine type of tester – printing technology
  - Substrate
  - Required ink film thickness
  - Printing form
  - Speed and pressure for print
  - Time to next process step (e.g. measurement or test)

Substrate (properties)

- Absorption
- Roughness / Smoothness
- Opacity
  - [influence of translucency]
- Gloss
- Felt and wire side
- Coating
- Colour
  - [L*a*b* not enough – OBA for example]

Ink properties

- Colour – recipe – pigments
- Transparency
- Ink film thickness
- Tack
- Viscosity
- Drying / Curing
- Resistances
- Fastnesses

Pre-press ink proofing system

- Printing process
  - Offset – Flexo – Gravure
- For each technique make prints with known settings
- Specify
  - PURPOSE OF THE TEST
  - Speed
  - Printing force
  - Ink distribution and inking time
  - Temperature – Relative Humidity

Determination of

- Colour
- Transparency
- Gloss - Light fastness
- Coverage - Ink transfer (in g/m^2) | (ml/m^2)

- Wear / scratch resistance
- Resistance to chemicals
- Flexibility

- Mottle - unevenness
- set-off - dry behaviour

Printability tester Flexo

- Printability tester to produce prints in flexo
  - Solvent based inks | UV | water based inks
  - Substrates – rigid and flexible (Corrugated board max 12 mm.)
  - Pre-inking of the anilox and photopolymer cylinder
  - Several photopolymer; halftone - thickness
- Electronic printing force and speed setting control
- Electronic printing speed: 0.2 – 1.5 m/s
- Printing / anilox force: 10 – 500 N
  - Includes gravure mode – direct on substrate
- (compliant ISO 2836 / ISO 2846-5)

  - Example: F1

Printability tester Offset

- Printability tester to produce prints in offset
  - Conventional and UV offset inks
  - Flat: print width 35 – 50 – 70 mm.
  - Round: cans with diameter 16 – 68 mm.
  - Different types of disk – full tone and half tone
  - Printing force 100-1.000 N
  - Printing speed 0.3 m/s
- (compliant ISO 2834-2 / ISO 2836 / ISO 2846-2)
  - Example: C1-5

Printability tester Gravure

- Printability tester for gravure prints
  - Conventional and UV gravure inks
  - All kind of gravure aniloxes
    - Ceramic – Chromium | l/cm | Stylus | Angle | Volume
  - Round to flat printing principle
  - Print width 45 – 65 mm.
  - Two revolutions of optimum filling the engraved cells

  - Example: G1-5

Requirement for test equipment

- Excellent reproducibility
- High degree of simulation of actual practice
- Consistent results
- Operator independent
  - Simple to operate

Pre-press ink proofing system

- Printability of paper
  - Standard printing conditions
  - Standard ink
- Properties of ink
  - Standard printing conditions
  - Standard paper
  - Or compare one ink on different paper
- If you want to test
  - There should be one variable

Predictability - Printing conditions

- Make your own pre-setting's (Printing conditions)
  - Substrate / ink combination
  - Speed
  - Printing force
  - Temperature – Relative Humidity
    - environment and materials
  - Clean materials – disk, photopolymer, doctor blade
  - Maintenance – calibration

Properties of draw down

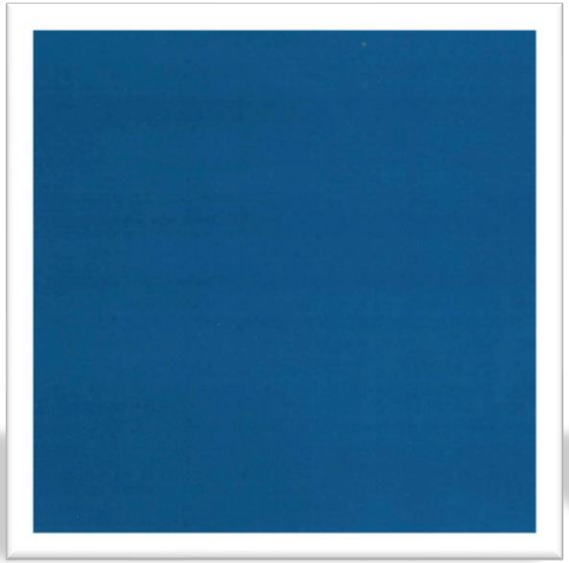
- Solid colour
- Half tone image
- Even print quality
  - Closed print structure
- Measure colour at last on 3 places
- Calculate average and ΔE2000 (company standard or reference)

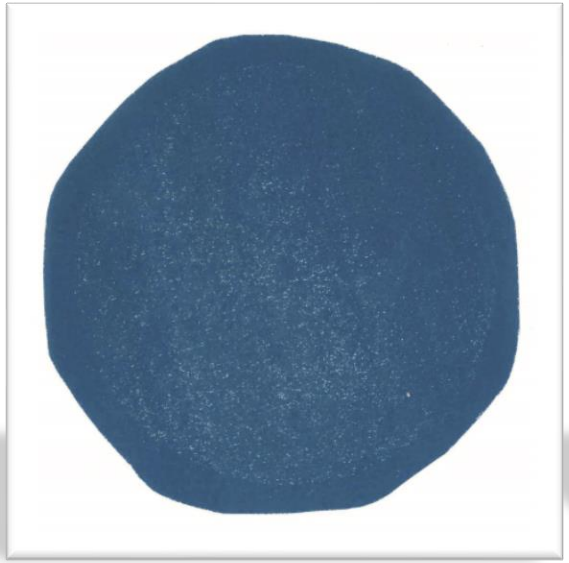
Application for draw down

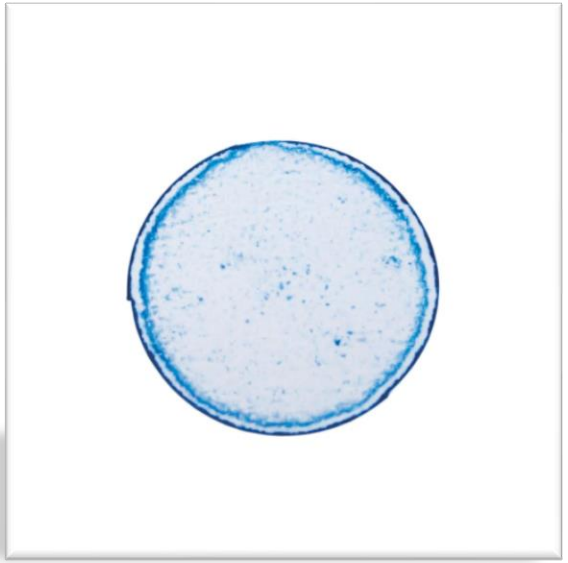
- Colour management
- Light fastness
- Gloss
- Transparency
- Flexibility
- Adhesion
- Print unevenness
- Abrasion resistance

Assessing rub, abrasion resistance

- Determine the abrasion resistance of a specimen
- Face-to-face, Face-to-back or foreign abrasion material
- Influence of pressure, temperature, moisture, speed







Assessing rub, abrasion resistance

- Sutherland method: ASTM D-5264-92 or TAPPI T-830
  - General: move a test strip over a printed specimen
  - Sled with rubber pad - optionally heated 20-200°C
  - Sled weight 2 or 4 lbs
  - Carrier with rubber pad
  - Speed 21 – 42 – 85 – 106 cycles/min
  - Rubbing with liquid

Assessing rub + environmental resistance

- Quartant Abrasion Tester
  - 4 Samples can be tested simultaneously (Diameter 45 mm)
  - Contact pressure 0,1 - 0,5 N/cm²
  - Number of strokes normally between 20-100 (max. 9.999)
  - Assess the test result
    - Visual comparison
    - Measure density difference
    - Gloss

Assessing rub + environmental resistance

- IGT RT4 rotational abrasion tester
  - Two counter-rotating rub discs (diameter 100 and 50 mm)
  - Contact pressure 1 or 2 PSI
  - Number of rotations normally between 20-100
  - Assess the test result
    - Visual comparison
    - Measure density difference
    - Gloss

Assessing rub + environmental resistance

- Precautions
  - Overheating the substrate due to friction
  - Additional scratches due to loose, hard particles
  - Difference between abrasion and adhesion
  - Proper drying/curing of the ink film

QA system

- Incoming goods QC
  - Raw materials, product verification
  - Food contact specifications and verification
- Post-press processing
  - Prepress (PDF) – proof – printing form
  - Functional test
- Process control
  - Colour, drying/curing, damages,
  - Press: Anilox (screen ruling/volume) ink type: solvent / water/UV, viscosity
  - Press: drying settings, speed, print forces
  - Press: L*a*b*-values – dot gains – contrast value
- Functional printing
  - Included sensors, printed electronics, RFID

QA system

• Laboratory	ISO 187
• Liquid inks	ISO 2431:2019 (Flow time)
• Paste inks (tack)	ISO 12634:2017
• Ink	ISO 2834 | ISO 2846-1/5
• Measuring	ISO 13655:2017 Spectral measurement
• Viewing	ISO 3664 Viewing conditions
• Offset+F+G+P	ISO 12647-2/4/6/7
• Chemical resistance	FTM 16 (FINAT)
• Ink adhesion	FTM 21
• Ink rub test for UV printed	FTM 27

- Etc.

Multi-purpose tester – your QA system

- R&D and process control with a bunch of test methods
- 1-6 printing shafts
- Adjustable speed 0,01 – 4,0 m/s
  - Constant and increasing speed
- Adjustable printing force (50-1000N)
- Printing size 50-200 mm.
- Doctoring systems
- Complete free programmable controllers
- Camera for analyses

  - Example: Amsterdam

Thank you!

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