

GRACE: “Steps forward in the Graphics Industries towards a Circular Economy”

Vergadering begeleidingsgroep 17 September 2024



Agenda

10h30 Welcome

11h00 Introduction

11h15 Status GRACE project

12h30 Lunch

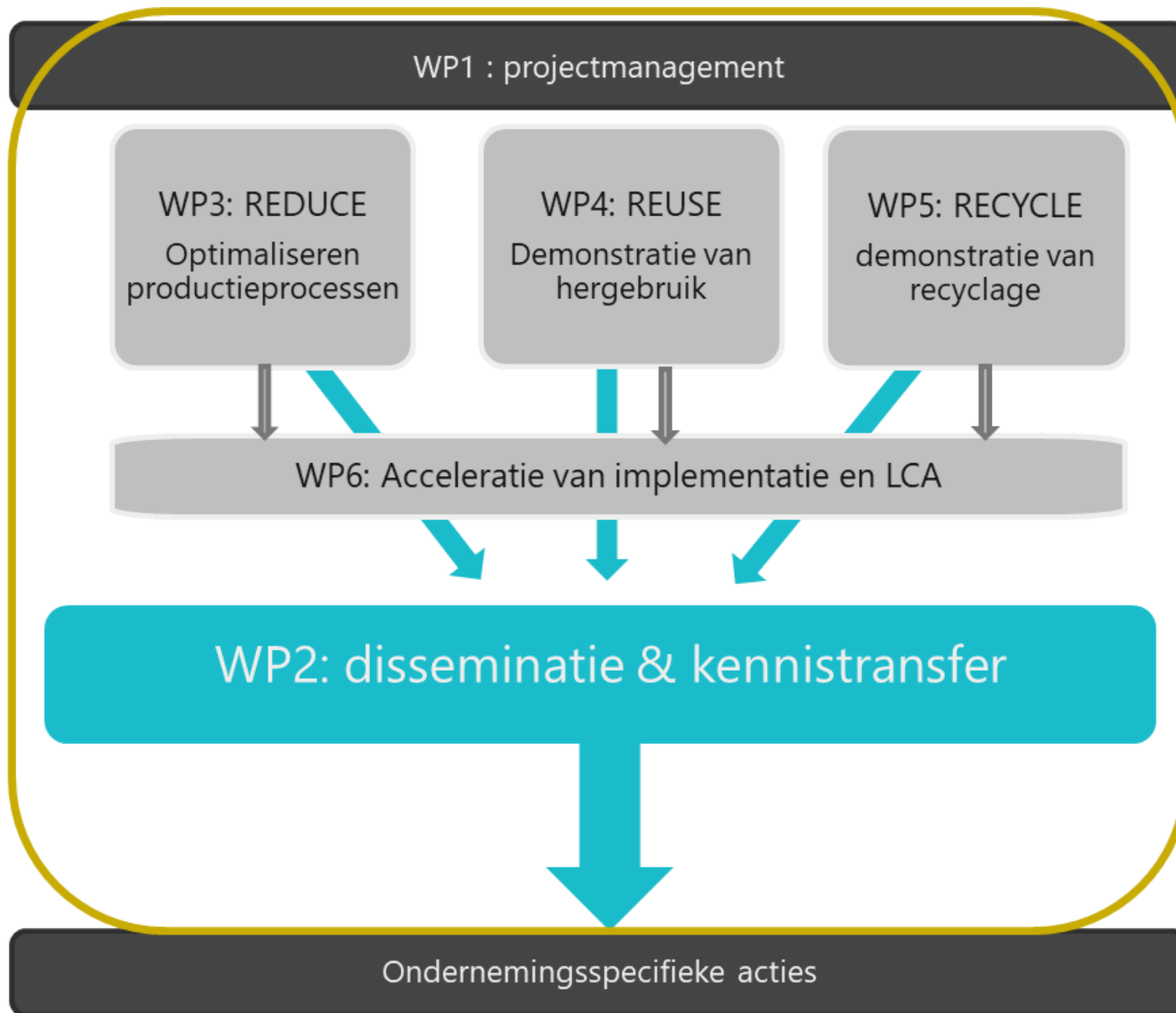
13h00: Company pitches

- IGEPA
- swissQprint
- IPB

13h45 Discussion

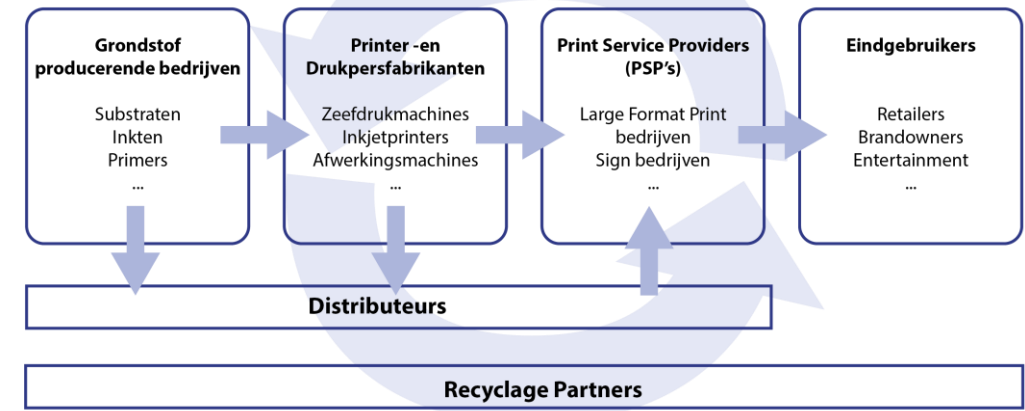
14h00: Company visit GRAFITYPE





Projectmanagement Guidance group

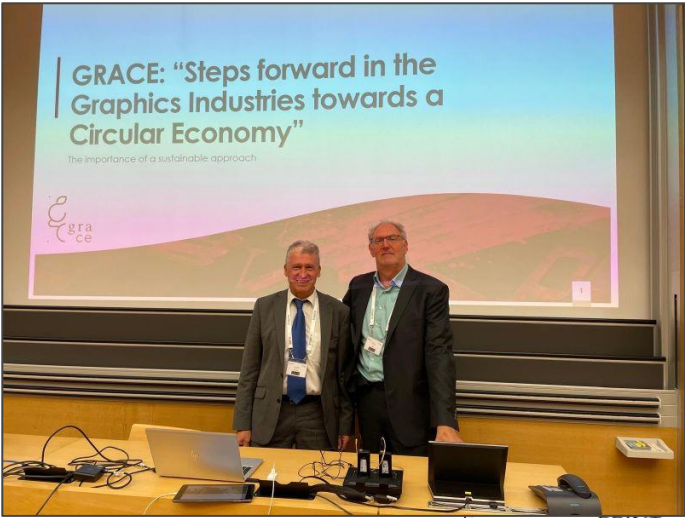
- 24 companies
- Covering whole value chain



3Motion	drukkerij zwartopwit	Igepa	Symeta Hybrid nv
Agfa-Gevaert	Eljes BVBA	IPB	VINK BV
Antalis	Fespa Belgium	PantoonBenes	VISIX NV
Burocad	Fotorama bv	Papyrus	Wollux
Canon Belgium	Grafityp Selfadhesive Products nv	Probo	Zenith Graphics
DIOSS Print Solutions	HoGent-FTILab	swissQprint	VLAIO

Dissemination wide publicity

- Articles, linkedin posts and a presentation on IARIGAI



Dissemination

First newsletter

SUBSCRIBE TO THE GRACE NEWSLETTER

Newsletter #01

28/08/2024

Contents

- 1. Printing with less ink
- 2. Recyclability of polypropylene
- 3. DRUPA: Sign & display-equipment
- 4. Company visit to Grafityp

Successful Deliveries	3,340
Total Opens	1,409
Unique Opens	911
Total Clicks	261
Unique Clicks	216
Recipients Who Clicked	82



Newsletter #01

28/08/2024

Met het [GRACE-project](#) hebben [Centexbel-VKC](#) (Kenniscentrum voor de Textiel- en Kunststoffsector) en [VIGC](#) (Vlaams Innovatiecentrum voor Grafische Communicatie) hun krachten gebundeld om de Print & Sign sector klaar te maken voor een circulaire economie. De principes van 'Reduce, Reuse en Recycle' vormen hierbij het uitgangspunt. Via publicaties, presentaties, trainingen en opleidingen delen we onze kennis.

With the [GRACE project](#), [Centexbel-VKC](#) (Knowledge Center for the Textile and Plastics Sector) and [VIGC](#) (Flemish Innovation Center for Graphic Communication) have joined forces to prepare the Print & Sign sector for a circular economy. The principles of 'Reduce, Reuse, and Recycle' form the foundation for this. Through publications, presentations, training sessions and courses, we share the knowledge we have gained.

Disseminatie en kennistransfer

Project website

<https://www.centexbelpresents.be/en/grace>



Grace

Coated and printed substrates are a major challenge for the circular economy and thus for the printing industry. Where the mind-set used to be purely on excellent technical performance and good adhesion of ink to the substrate, today additional focus is put on a circular economy, where inks and coatings need to be removed, but also material efficiency, reuse and recycling are on the agenda.

Most Large Format Print & Sign (LFP&S) producers are still in the early stages of the transition to a circular economy.

For the first time in the creation of both organisations, Centexbel-VKC (Knowledge Centre for the Textile and Plastics Sector) and VIGC (Flemish Innovation Centre for Graphic Communication) will join forces to prepare the Large Format Print & Sign sector for a circular economy through market-ready concepts.

THE TARGET GROUP CONSISTS MAINLY OF SMES WHERE THERE IS STILL ROOM AND THE WILL TO MAKE PRODUCTS MORE CIRCULAR. IN ADDITION, THE RECYCLING SECTOR IS ALSO PART OF THE GRACE TARGET GROUP AS RECYCLING IS ONE OF THE 3 THEMES.

REUSE

Dissolution of inkt

Try to dissolve UV based ink from PVC substrate using range of solvents:

- Ethyl acetate
- Anisole
- Butylether
- Butylacetate
- Propylal
- Ethylal

Unsuccesfull and PVC becomes soft

Reuse in this case: lamination of new PVC top layer

RECYCLE

Thermoplastic recycling of PP

Collect material

Shredding materials

- Reduce size to 4-6mm “flake”

Pelletize

- Turn sometimes fluffy flake into round, even pellers
- Specialty lines exist to remove odours & colours
- Applying high vacuum over melt
 - Erema, Starlinger
- Non volatile inks remain behind!



RECYCLE

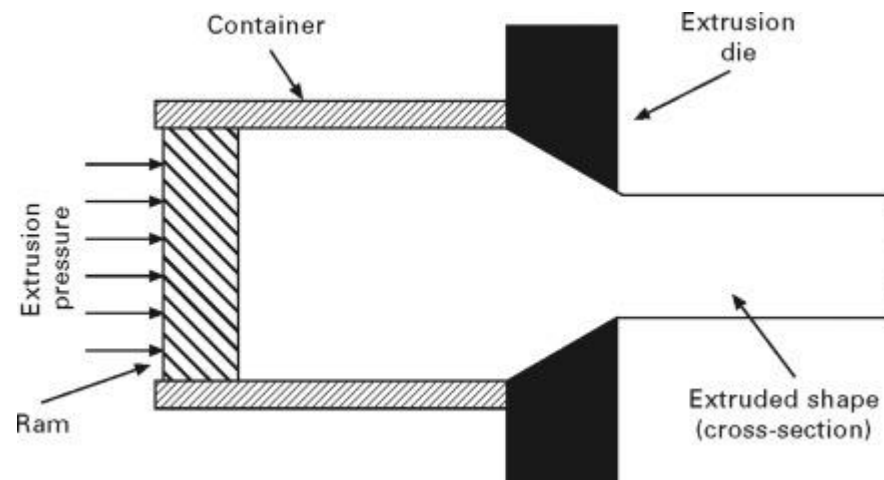
Thermoplastic recycling of PP

PP is sensitive to UV

- Not a problem for recycled material: only small surface layer is affected

After repelletizing the PP can be turned into new products:

- Important to know size of contaminations
- At least 3x smaller than extruder filter/die

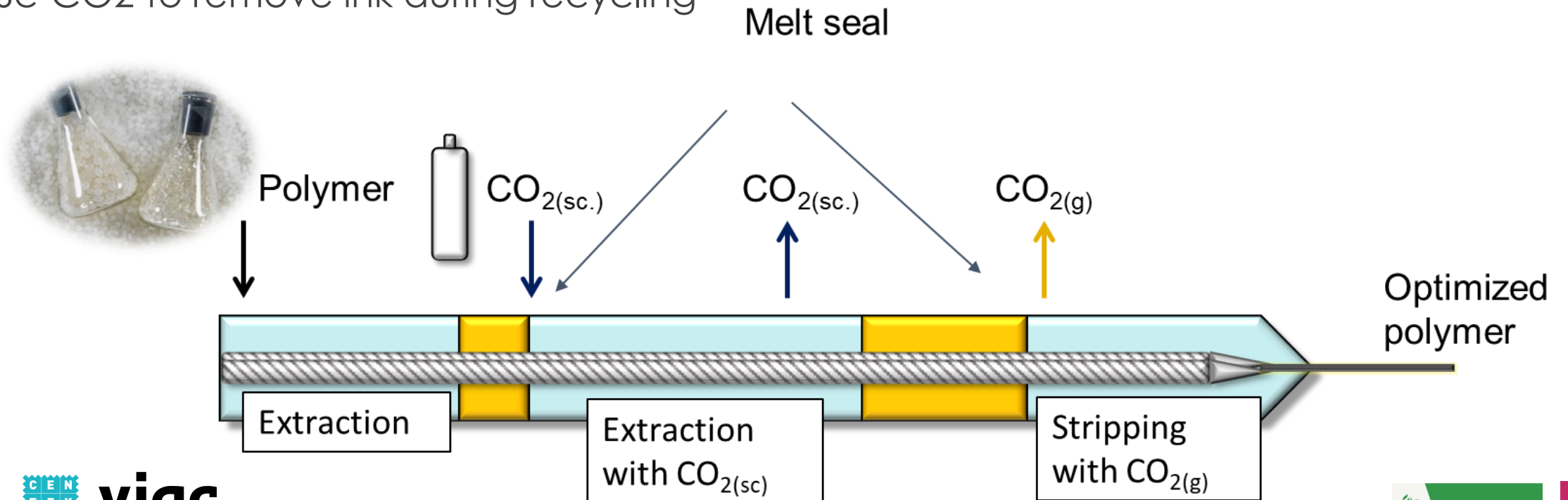


RECYCLE

sc CO₂ extraction

Different methods of deinking during recycling

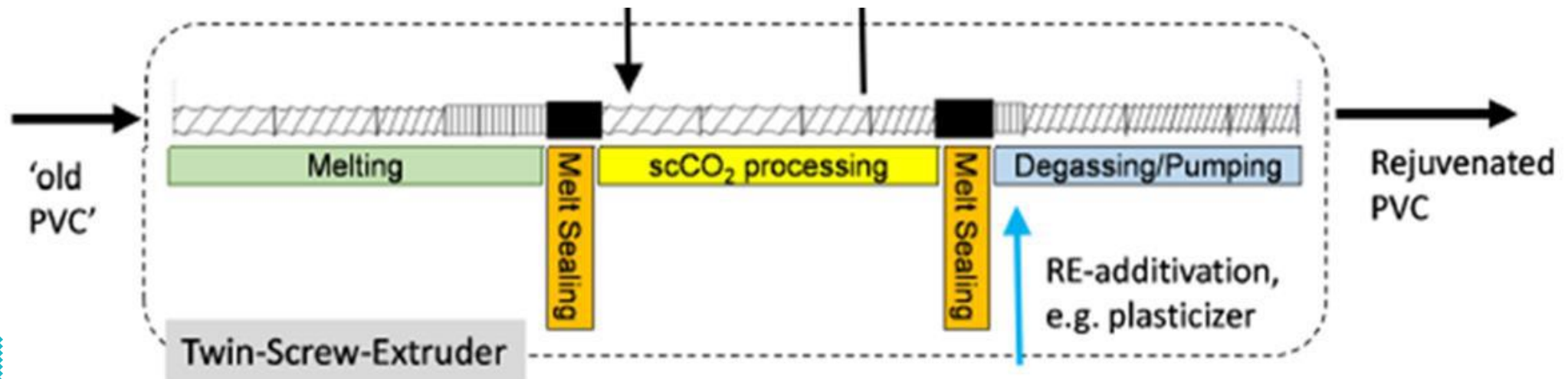
- E.g. Erema: pretreatment, washing steps to remove ink
 - Using surfactants
- Sc-CO₂ to remove ink during recycling



RECYCLE

sc CO₂ extraction

- Include cosolvent during extraction
- CO₂ flow optimized based on material
- Initial trials in lab scale batches
- Afterwards continuous extraction in extrusion
- Removal rate varies from 50 to 75% in previous projects



Circular economy

Basic principles

- Keep value
- Avoid waste (value loss)
- Minimise environmental impact (impact from beginning to end)



Raw materials
(extraction)



Production
(refining)



Printing



End-of-life

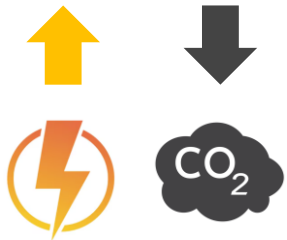
Circular economy

Basic principles

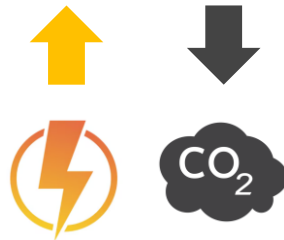
- Keep value
- Avoid waste (value loss)
- Minimise environmental impact (impact from beginning to end)



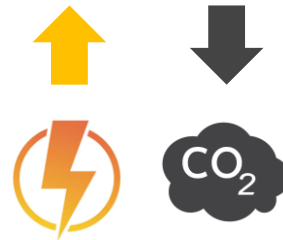
Raw materials
(extraction)



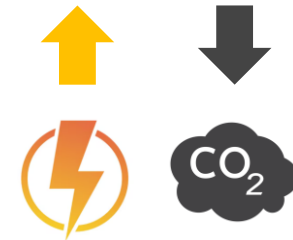
Production
(refining)



Printing



End-of-life



Circular economy

Less raw materials

What to do?



Raw materials
(extraction)



=



Society
(role, value)

*



Products
(function)

*



Materials
(production waste)

*



Raw materials
(recycling)

Less product?

Less material?

Less raw material?

Large Format Print & Sign

Project overview

Reduce

1. Nesting & gangrun printing: Grouping orders to reduce cutting waste
2. Reduction of product size: Design smaller products with the same visual impact
3. Using materials for multiple campaigns
4. Ink reduction: Reducing ink consumption without losing visual quality

Reuse

1. Chemical : Removal of ink with solvents, enzymatic treatments or other methods for discolouration.
2. Physical: Removal of top layer or application of new top layer
3. Use of a sacrificial layer

Recycle

1. Thermoplastic recycling
2. Purifying with scCO_2
3. Recycling of removed coatings & inks

Large Format Print & Sign

Project overview

Reduce

1. Nesting en gangrun printing: Grouping orders to reduce cutting waste
2. Reduction of product size: Design smaller products with the same visual impact
3. Using materials for multiple campaigns
4. **Ink reduction: Reducing ink consumption without losing visual quality**

Reuse

1. Chemical : Removal of ink with solvents, enzymatic treatments or other methods for discolouration.
2. Physical: Removal of top layer or application of new top layer
3. Use of a sacrificial layer

Recycle

1. Thermoplastic recycling
2. Purifying with scCO_2
3. Recycling of removed coatings & inks

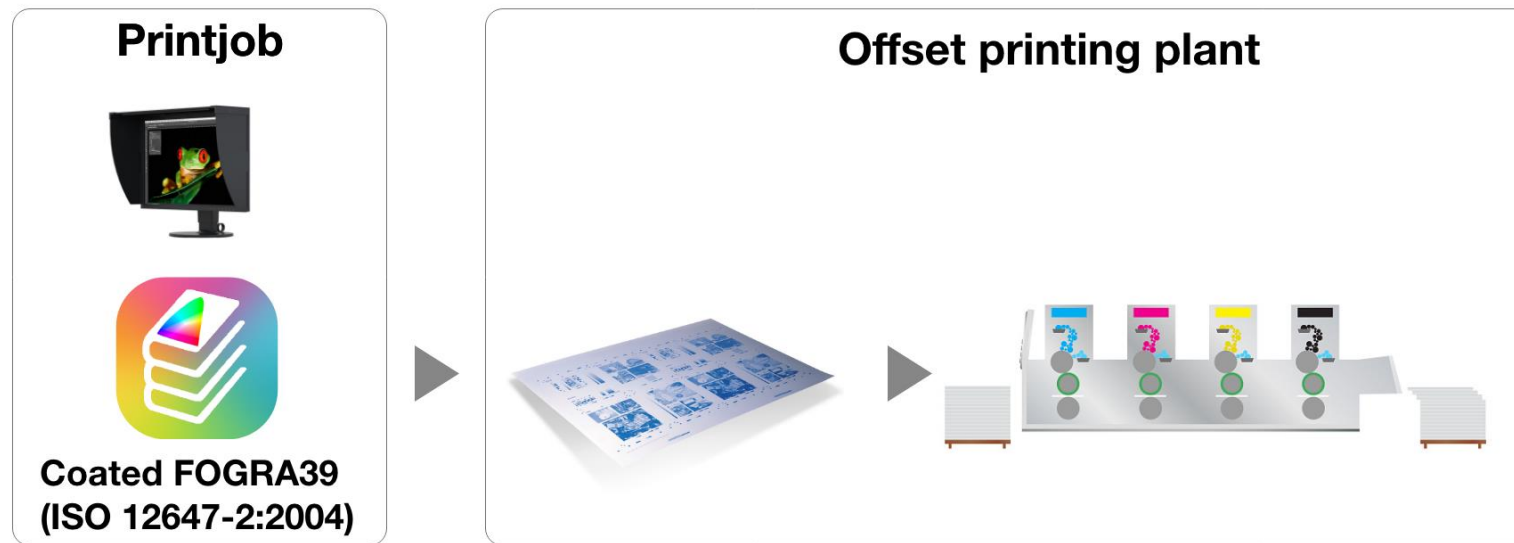
Ink reduction

Digital printing versus offset



Offset printing

No color transformation needed!



Standardized color (ISO 12647-2)

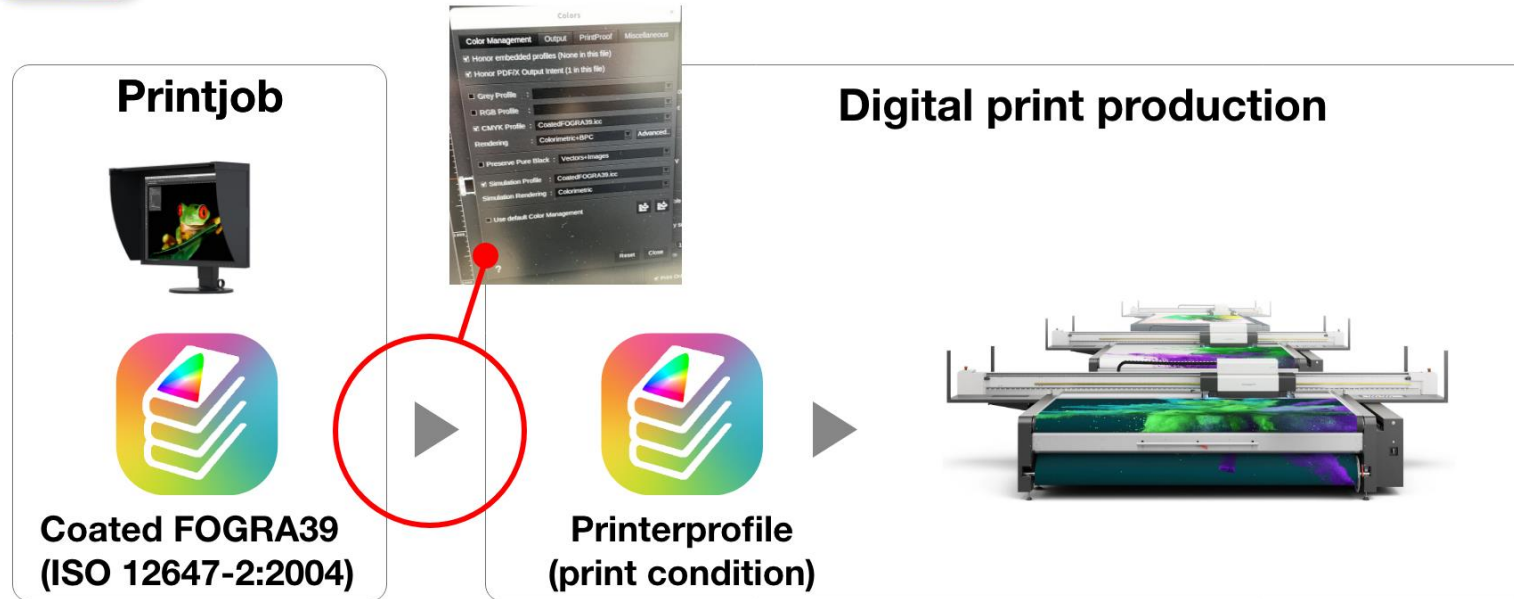
Ink reduction

Digital printing versus offset



Digital printing

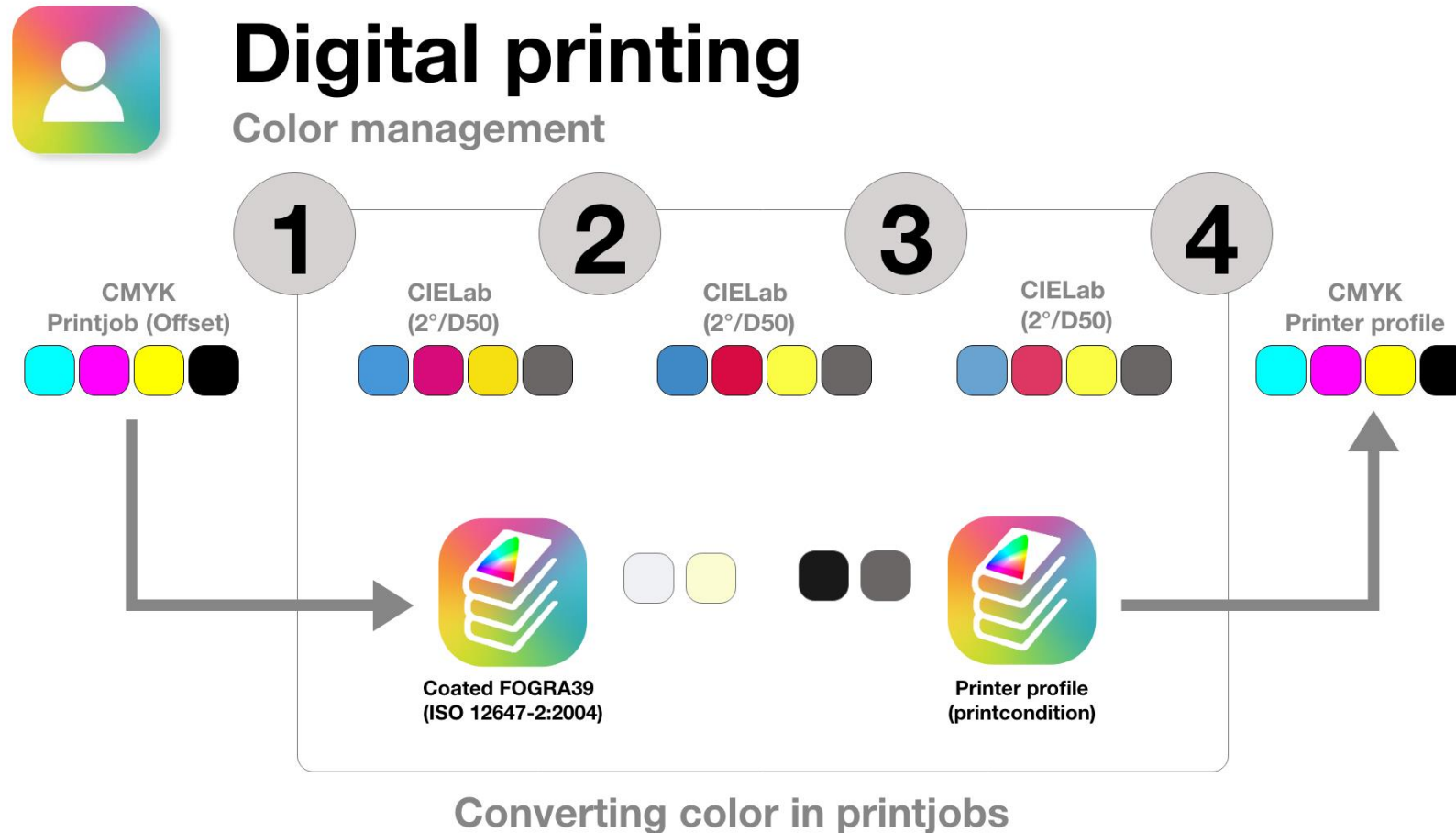
Always a color transformation needed!



Non - standardized color

Ink reduction

Color management in digital printing



Ink reduction

Results from the Design4Food-project (2014-2016)



Maximum Ink coverage

How 'dark' can you print in offset?

RGB = 0,0,0
Lab = 0,0,0



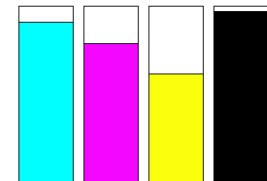
CMYK = 91, 79, 62, 97
Lab = 10,0,0



sRGB IEC61966-2.1



Coated FOGRA39
(ISO 12647-2:2004)



91% 79% 62% 97%

Max. Ink coverage

329%

The 'Source Black Point' in offset printing

Ink reduction

Results from the Design4Food-project (2014-2016)



Maximum Ink coverage

How 'dark' can you print in offset?

RGB = 0,0,0
Lab = 0,0,0



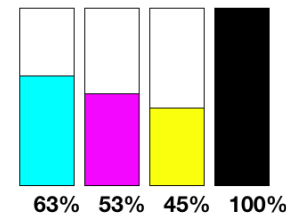
CMYK = 63, 53, 45,100
Lab = 10,0,0



sRGB IEC61966-2.1



ISOCoated_VIGC_39L_260



Max. Ink coverage

261%

The 'Source Black Point' in offset printing

Ink reduction

Results from the Design4Food-project (2014-2016)



Grey Component Replacement

How much black ink is used in the separation?

RGB = 126,118,102
Lab = 50, 0, 0

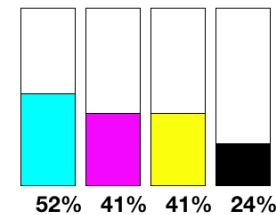
CMYK = 52, 41, 41, 24
Lab = 48, 0, -1



sRGB IEC61966-2.1



Coated FOGRA39
(ISO 12647-2:2004)



Ink coverage
158%

Separating grey & low chromatic colors

Ink reduction

Results from the Design4Food-project (2014-2016)



Grey Component Replacement

How much black ink is used in the separation?

RGB = 126,118,102
Lab = 50, 0, 0

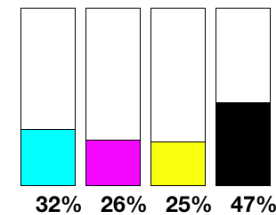
CMYK = 52, 41, 41, 24
Lab = 48, 0, -1



sRGB IEC61966-2.1



ISOCoated_VIGC_39L_260



Ink coverage
130%

Separating grey & low chromatic colors

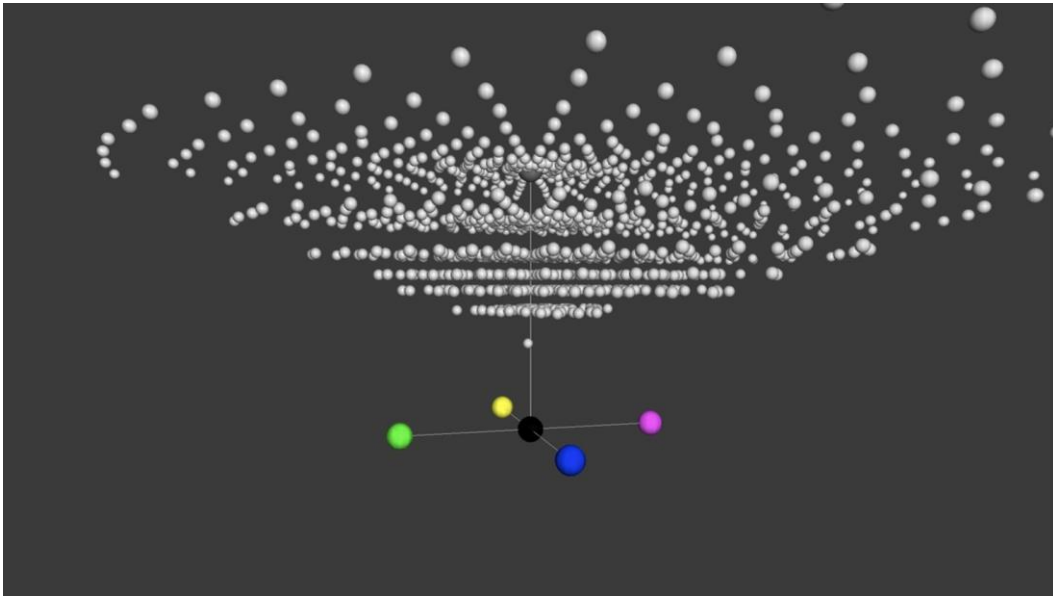
Ink reduction In practise

- swissQprint Nyala 4 large format printer
- Caldera software
- QBN KX2_2 1280 NG substrate
- CMYK inkset
- Resolution: 1015 X 900 dpi
- Printquality: quality
- Job-profile: 'Coated FOGRA39'
- Rendering: colorimetric + BPC



Ink reduction Methods

- Calculation of a 'dark colors' and 'full gamut' – testchart
- Printing using 3 different printer profiles: maximum ink coverage 350% - 260% - 220%
- Read the ink consumption & measure the color performance



Key	1111
Name	FLATBED_PRINT_TEST_v3_oke.rtl
Printed on	17/04/2024 15:08
Type	Normal
Mode	flatbed
Print duration	2 min 19 s
Surface	0.643298 m ²
Linear metre	0.668426 m
Cyan	2.0587 ml
Magenta	1.27405 ml
Yellow	2.22283 ml
Black	2.36405 ml
Total	7.91963 ml

Results

Color evaluation

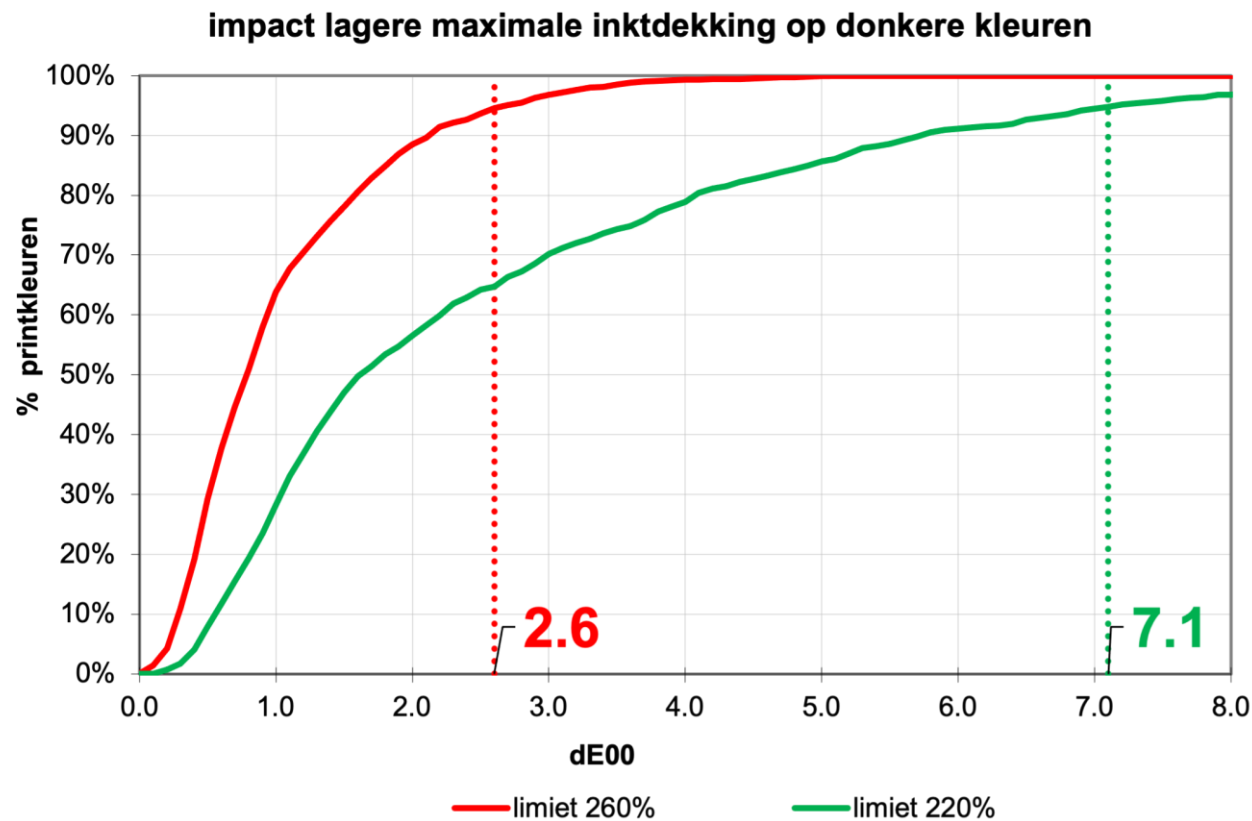
- Visual



Results

Color evaluation

- By numbers



Results

Ink consumption

- Example print: -28%

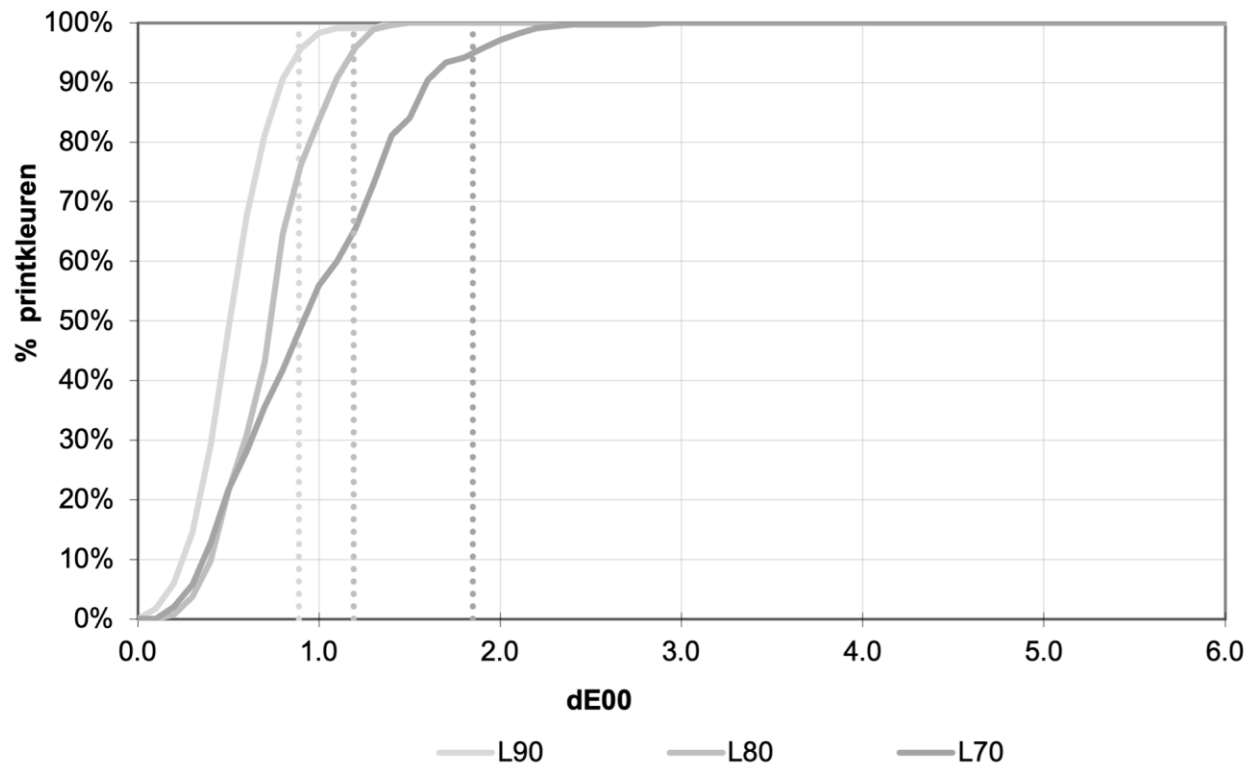
Key	1111
Name	FLATBED_PRINT_TEST_v3_oke.rtl
Printed on	17/04/2024 15:08
Type	Normal
Mode	flatbed
Print duration 2 min 19 s	
Surface	0.643298 m ²
Linear metre	0.668426 m
Cyan	2.0587 ml
Magenta	1.27405 ml
Yellow	2.22283 ml
Black	2.36405 ml
Total	7.91963 ml

Key	1110
Name	FLATBED_PRINT_TEST_v3.rtl
Printed on	17/04/2024 15:05
Type	Normal
Mode	flatbed
Print duration 2 min 18 s	
Surface	0.643298 m ²
Linear metre	0.668426 m
Cyan	1.34919 ml
Magenta	0.756873 ml
Yellow	0.920811 ml
Black	2.63912 ml
Total	5.66599 ml

Results

Adding light magenta & light cyan

- Extension: printing with 6 colors, light magenta & light cyan



Key	1116	Key	1117
Name	Shadow Files printing: TES	Name	Shadow Files printing: TES
Printed on	17/04/2024 16:04	Printed on	17/04/2024 16:08
Type	Normal	Type	Normal
Mode	flatbed	Mode	flatbed
Print duration	1 min 49 s	Print duration	1 min 48 s
Surface	0.557858 m ²	Surface	0.557914 m ²
Linear metre	0.280932 m	Linear metre	0.280961 m
Cyan	0.261192 ml	Cyan	0.03554 ml
Magenta	0.283033 ml	Magenta	0.0313681 ml
Yellow	0.546738 ml	Yellow	0.555505 ml
Black	0.207255 ml	Black	0.202425 ml
Light Cyan		Light Cyan	0.571705 ml
Light Magenta		Light Magenta	0.756919 ml
Total	1.29822 ml	Total	2.15346 ml

First conclusions

Ink reduction

- ink savings depend primarily on the content of the print job. When reproducing dark and/or non-chromatic colours, the saving can be considerable.
- 260% maximum ink limit shows no visible color defects
- Printing with extra colors (light magenta, light cyan) significantly raises ink consumption

Project website: <https://www.centexbelpresents.be/en/grace>

Thank you!

GRACE: workshops proposal

Vergadering begeleidingsgroep 17 September 2024



Ink reduction workshop

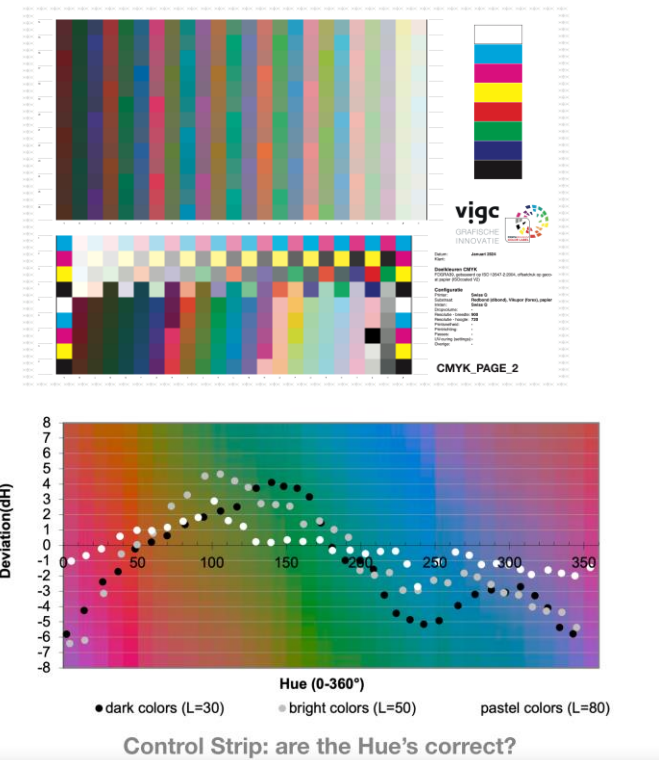
Proposal

- Quality color management
 - Communicating your workflow settings
 - Calculating testforms for your goals
 - How accurate & predictable is color printed in your large format print configuration?
 - Optimising workflow settings in function of your goal (offset color, maximum color,...)
- Analyse your print job design(s)
 - How printable is the design?
 - Comparing the ink coverage of different separation methods
 - How much ink can be saved by using optimising Maximum Ink coverage & Grey Component Replacement?

Ink reduction workshop

Proposal

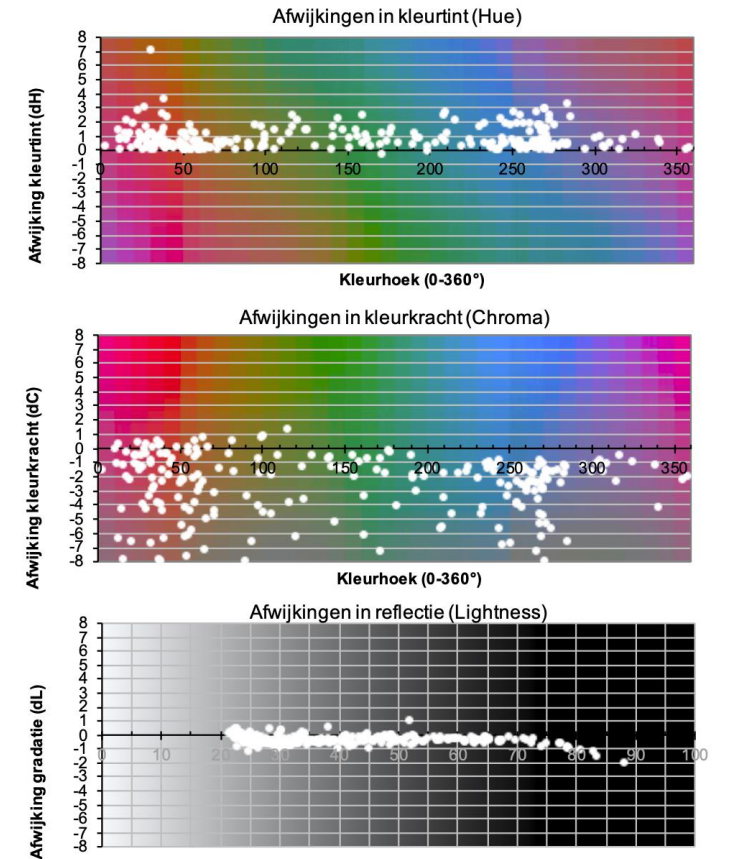
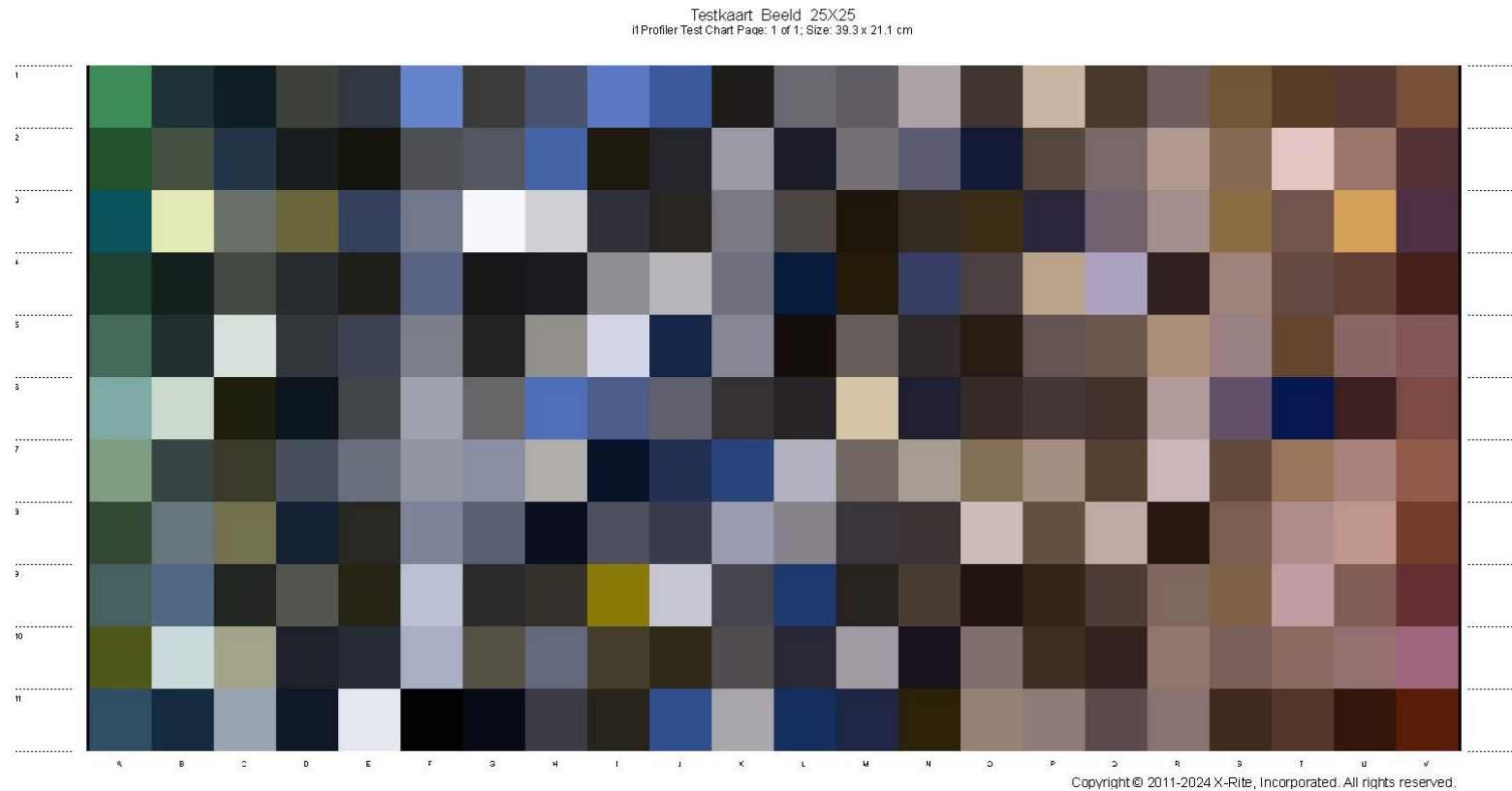
Printer	Substrate	CMYK-profile	Rendering intent	RGB-profile	Rendering intent
Fujifilm Onset R40	Postermat 250g moorman	Coated FOGRA39	Relative colorimetric	-	-
Fujifilm Onset R40	Forex	Coated FOGRA39	Relative colorimetric	-	-
Latex 3600	Vinyl white glossy	Coated FOGRA39	Perceptual	sRGB IEC61966-2.1	Perceptual
Agfa Tauro 3300	Coated Mat Paper 250 gr	Coated FOGRA39	Perceptual	sRGB IEC61966-2.1	Perceptual
SwissQprint Nyala 4	Alupanel 3D 3mm	Coated FOGRA39	Perceptual	Adobe RGB (1998)	Perceptual
Oberon AGFA	spandoek	Coated FOGRA39	Relative colorimetric	sRGB IEC61966-2.1	Relative colorimetric
Agfa Tauro	DiBond	Coated FOGRA39	Relative colorimetric	sRGB IEC61966-2.1	Relative colorimetric
Dgen H12 (dye sub)	Georg+Otto Friedrich 7048GFS	ISO Coated v2 eci	Perceptual	sRGB IEC61966-2.1	Perceptual
Canon Colorado	Posterpapier	ISO Coated v2 eci	Relative colorimetric + BPC	sRGB IEC61966-2.1	Perceptual
Swiss Q Nyala	Forex	ISO Coated v2	Relative colorimetric + BPC	sRGB IEC61966-2.1	Perceptual
Agfa Anapurna 2050i led	STICKER	Coated FOGRA39	absolute colorimetric + preserve white	-	-
Agfa Anapurna 2050i led	FOREX	Coated FOGRA39	absolute colorimetric + preserve white	-	-
Agfa Anapurna H3200i LED	Sticker 3651M	Coated FOGRA39	Perceptual	-	-
Agfa Oberon-RTR3300	Frontlit	Coated FOGRA39	Perceptual	-	-
SWISS Q Nyala-4-i	Dibond 2403	-	-	Adobe RGB (1998)	Relative colorimetric + BPC
SWISS Q Nyala-4-i	Invercoat	Coated FOGRA39	Relative colorimetric + BPC	sRGB IEC61966-2.1	Relative colorimetric + BPC
SWISS Q Nyala-4-i	Invercoat	eciCMYK_v2 (FOGRA59)	Relative colorimetric + BPC	-	-



- Color management (bron: Fespa Color label)

Ink reduction workshop

Proposal



- Your design



Willem Uyttendaele
Onderzoeker finishing
& coating



wu@centexbel.be

vigc

Fons Put
Senior Innovation
Consultant



Fons.put@vigc.be