

INNOVATIVE

SYSTEMS

TO MASTER

COLORS

END-TO-END

REMOTELY

THE COLOR COMMUNICATION **REVOLUTION**



COLOR**GRAIL**

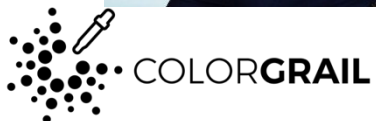
FFI – 25th October 2023



- Founder & CEO, Color Grail
- Graduated in Ecole des Mines de Paris, Franck spent 7 years at McKinsey (basic materials, automotive, electronics, luxury goods). Then he has been the Chief Strategy Officer at LVMH-Moët Hennessy (wines & spirits) and the Global Head of Insurance Procurement/claims at AXA. He has been the founder and CEO at AXA Alpha Scale (€180M turnover)



- Head of Technology BU Tobacco at Siegwirk Druckfarben
- Since 20 years with Siegwirk
- Chemist, graduated from Rheinische Friedrich-Wilhelms-Universität Bonn





- New & unique spectral color measurement technology
- Intuitive handling & user experience
- Ready to communicate with the world – remote features built-in, smooth integration in the packaging workflow
- Agile collaboration & product development, custom colors, live reports in your hands
- Continuous improvement to fuel innovation between brands and their suppliers
- Industries: brand owners, pack, label, plastic, inks, bulks...
- Geos: all continents, focus on Europe+Asia



L'ORÉAL



and many more...

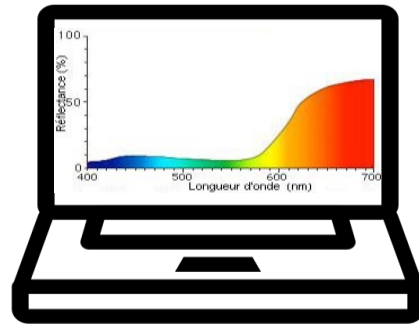
SPECTROPHONE MEASURE TECHNOLOGY

SPECTRAL MEASURES LIKE LEGACY SPECTROS, NO EDGE LOSS FOR PLASTICS, 1D/2D/3D

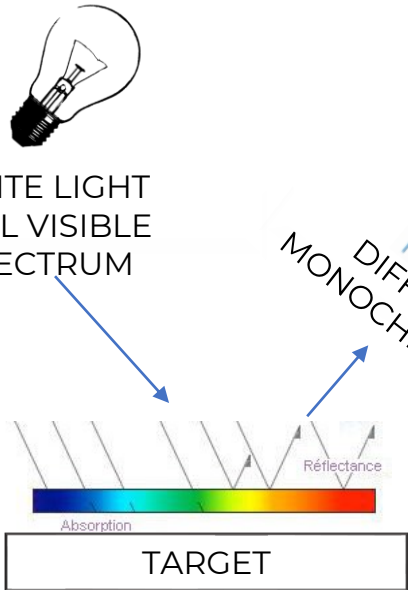
CONVENTIONAL SPECTROS



REFLECTANCE / SPECTRAL CURVE

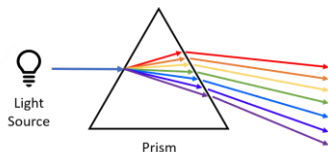


WHITE LIGHT = ALL VISIBLE SPECTRUM



LIGHT SENSORS

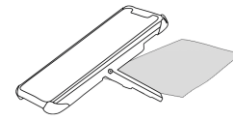
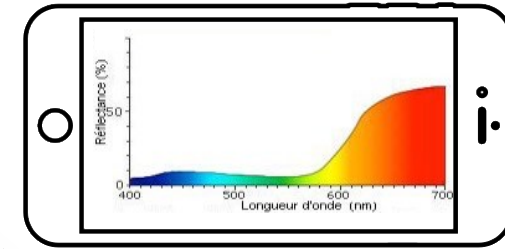
DIFFRACTION MONOCHROMATEUR



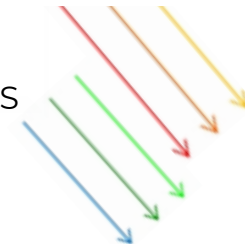
COLOR GRAIL SPECTROPHONE



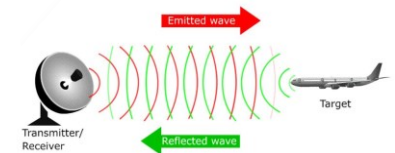
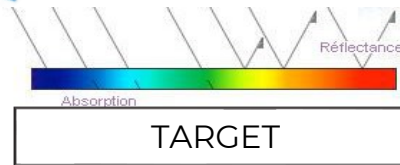
REFLECTANCE / SPECTRAL CURVE



SEVERAL COLOR LED LIGHTS



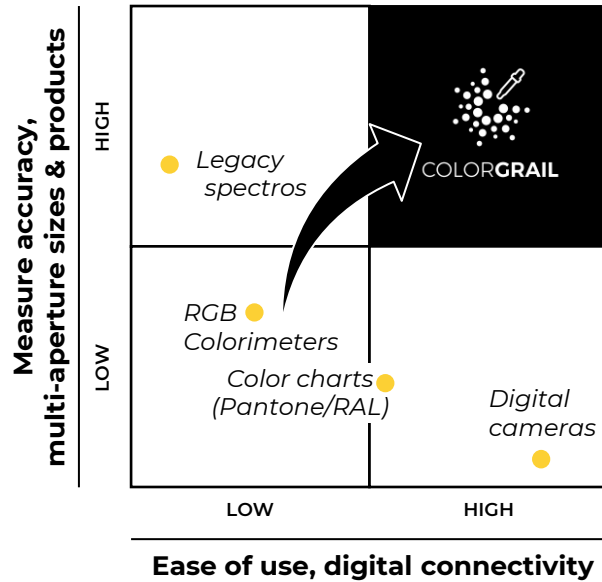
IPHONE CAMERA + COLOR RADAR ALGORITHMS



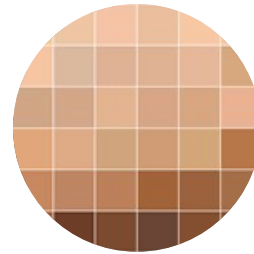
1: Spectrophone 3 matches legacy 0-45° spectros (e.g. X-Rite, Techkon) and spherical spectros (e.g. Datacolor 850) with $dE \leq 0.8$ on average. Spectrophone 3 inter-instrument : $dE = 0.3$; spectrophone 3-year price in line with competition

THE "SPECTROPHONE 3 PRO"

A "SWISS ARMY KNIFE" TO SERVE ALL BRAND NEEDS



SOLID COLORS¹
(PRINTING, 45/0°, VARIABLE APERTURE SIZES)



TRANSLUCENT COLORS
(LABEL, POLYMER, GLASS, LIQUID, BULK)



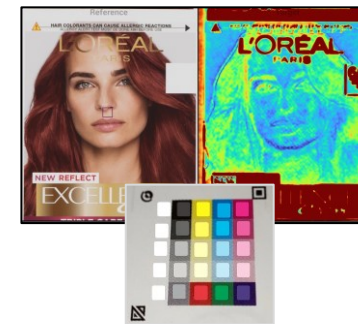
METALLIC AND EFFECT COLORS
(MULTI-ANGLES, GLOSS, HAZE, FLOP)



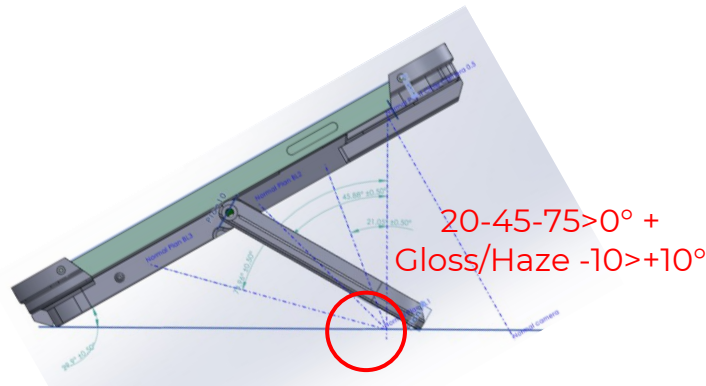
3D OBJECTS



IMAGES: COLOR HEATMAPS, MINI CHARTS², TEXT



COLOR FORMULATION (INKS, R-PET)...



(Q4-23)

(Q4-23)



1: fully compatible with legacy 45/0° spectros (X-Rite, Techkon...) to facilitate a seamless integration with tools/IT systems at suppliers

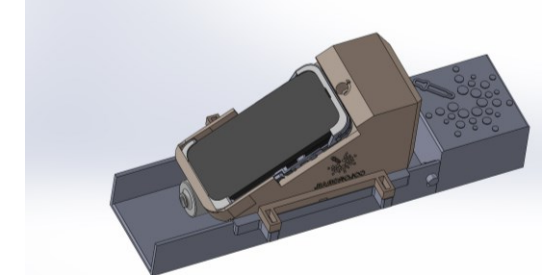
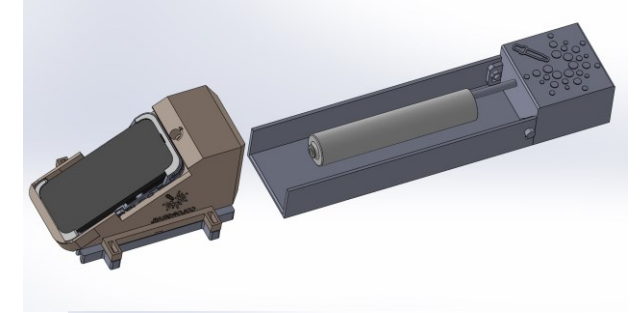
2: Spot color, CMYK, CMYK0GB

OPTIONAL ACCESSORIES FOR THE SPECTROPHONE 3 PRO

FACILITATE MEASURES WITH VARIOUS ENVIRONMENTS/OBJECTS

DOCKING STATION

- Operate with variable/powerful external lights (e.g. outdoor, production workshop)
- Press target
- Measure bottles/tubes



OBJECT HOLDERS

- Measure plastic chips, caps...



WHY COLOR GRAIL IS DISRUPTIVE?

1. QUALITY



ELIMINATE COLOR DEVIATIONS

EXAMPLES:

- Complement subjective perception with objective measurement during proofing & production
- Remove unnecessary discussions between marketing/dev/suppliers
- Control process & quality along the value chain
- Enable "Color autocontrol" by production operators to remove color variations & provide traceability

REDUCE DEV TIMES

EXAMPLES:

- Communicate live, prepare approvals remotely, enable smooth X-regional communication & efficient project transfer
- Integrate into the design creation process (Marketing),
- Simulate & check the ability to industrialize the models/prototypes at very early stage to avoid back & forth later

2. TIME-TO-MARKET



4. SUSTAINABILITY

ESG



LESS WASTES/TRAVELS, MORE RECYCLED

EXAMPLES:

- Reduce travels & operate remotely to prepare and facilitate print approvals
- Simulate ink triptyques with Epson instead of running machines
- Reduce wastes with "Color autocontrol" by production operators
- Manage actively color variations of recycled materials (polymer, glass), hence the %use

REDUCE COSTS, GROW TOP LINE

EXAMPLES:

- Reduce costs : proofing, models/prototype, transport, wastes/complaints, non-quality, footprint optimization
- Grow top line at brand owners and suppliers
- Benefit from low capex & very fast pay back (1 spectrophone/year = 1 proofing day)

3. BOTTOM-LINE

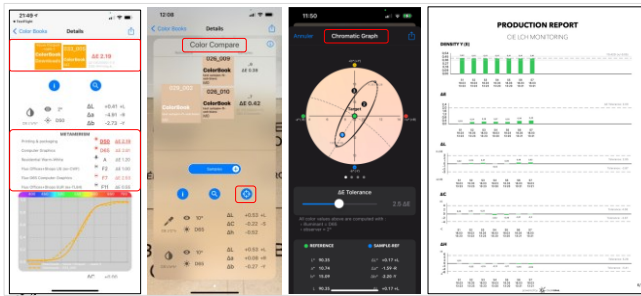


4. SUSTAINABILITY - DEMO VIDEOS

“COLOR AUTOCONTROL” AT SUPPLIERS

Objectives

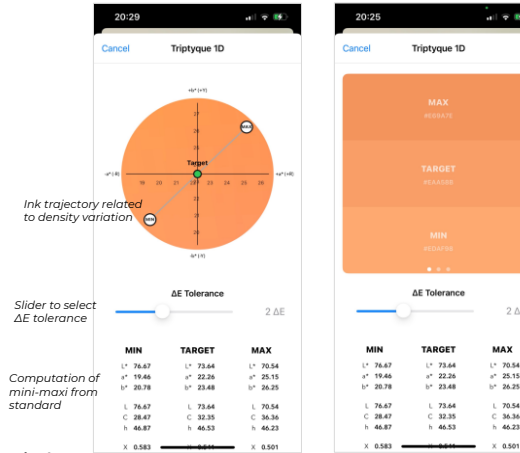
- Eradicate color variabilities/qc exemptions during production
- Operators at supplier to check colors like brand owners with a spectrophone
- PDF report to give full traceability to supplier management and brand owner QC
- Very low cost, very easy to implement
- Additional benefit: equip suppliers with Color Grail to reduce dev time



5

“INK TRIPTYQUE WITH EPSON”

OBJECTIVE: COMPUTE MINI-MAXI FROM STD WITH DENSITY VARIATION, THEN DRIVE EPSON



Excel to drive Epson with 2-3 iterations to secure that the Epson printout perfectly matches the mini-std-maxi colors (algo is similar to CMYK compensation curves)

Iteration #1	Iteration #2	Iteration #3																																																																																	
<table border="1"> <thead> <tr> <th>Iteration #1</th> <th>Iteration #2</th> <th>Iteration #3</th> </tr> </thead> <tbody> <tr> <td>MIN</td> <td>TARGET</td> <td>MAX</td> </tr> <tr> <td>L*</td> <td>73.64</td> <td>70.54</td> </tr> <tr> <td>a*</td> <td>22.26</td> <td>25.15</td> </tr> <tr> <td>b*</td> <td>23.48</td> <td>26.25</td> </tr> <tr> <td>L</td> <td>73.64</td> <td>70.54</td> </tr> <tr> <td>C</td> <td>32.35</td> <td>36.36</td> </tr> <tr> <td>H</td> <td>46.53</td> <td>46.23</td> </tr> <tr> <td>X</td> <td></td> <td>0.501</td> </tr> </tbody> </table>	Iteration #1	Iteration #2	Iteration #3	MIN	TARGET	MAX	L*	73.64	70.54	a*	22.26	25.15	b*	23.48	26.25	L	73.64	70.54	C	32.35	36.36	H	46.53	46.23	X		0.501	<table border="1"> <thead> <tr> <th>Iteration #1</th> <th>Iteration #2</th> <th>Iteration #3</th> </tr> </thead> <tbody> <tr> <td>MIN</td> <td>TARGET</td> <td>MAX</td> </tr> <tr> <td>L*</td> <td>73.64</td> <td>70.54</td> </tr> <tr> <td>a*</td> <td>22.26</td> <td>25.15</td> </tr> <tr> <td>b*</td> <td>23.48</td> <td>26.25</td> </tr> <tr> <td>L</td> <td>73.64</td> <td>70.54</td> </tr> <tr> <td>C</td> <td>32.35</td> <td>36.36</td> </tr> <tr> <td>H</td> <td>46.53</td> <td>46.23</td> </tr> <tr> <td>X</td> <td></td> <td>0.501</td> </tr> </tbody> </table>	Iteration #1	Iteration #2	Iteration #3	MIN	TARGET	MAX	L*	73.64	70.54	a*	22.26	25.15	b*	23.48	26.25	L	73.64	70.54	C	32.35	36.36	H	46.53	46.23	X		0.501	<table border="1"> <thead> <tr> <th>Iteration #1</th> <th>Iteration #2</th> <th>Iteration #3</th> </tr> </thead> <tbody> <tr> <td>MIN</td> <td>TARGET</td> <td>MAX</td> </tr> <tr> <td>L*</td> <td>73.64</td> <td>70.54</td> </tr> <tr> <td>a*</td> <td>22.26</td> <td>25.15</td> </tr> <tr> <td>b*</td> <td>23.48</td> <td>26.25</td> </tr> <tr> <td>L</td> <td>73.64</td> <td>70.54</td> </tr> <tr> <td>C</td> <td>32.35</td> <td>36.36</td> </tr> <tr> <td>H</td> <td>46.53</td> <td>46.23</td> </tr> <tr> <td>X</td> <td></td> <td>0.501</td> </tr> </tbody> </table>	Iteration #1	Iteration #2	Iteration #3	MIN	TARGET	MAX	L*	73.64	70.54	a*	22.26	25.15	b*	23.48	26.25	L	73.64	70.54	C	32.35	36.36	H	46.53	46.23	X		0.501
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Note: the illuminant (D50, F2...) and the fluo mode (M0/M1/M2) and the dE type (e.g. CIE 2000(2;10;5)) can be customized to match with lighting conditions and avoid metamerism between skirt and Epson (inks, substrates)

10

2D : COLOR HEATMAP PROTOTYPE

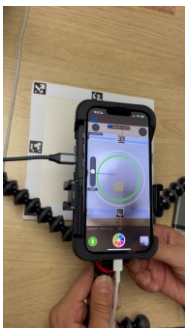
STEP 1

Position the "qr-code frame" on the images (ref & sample)



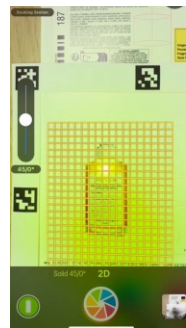
STEP 2

Position the spectrophone above the frame & images



STEP 3

Measure the images (ref & sample)



STEP 4

Compare images (sample vs. ref)

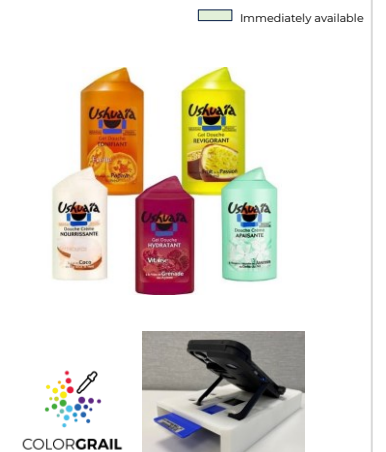
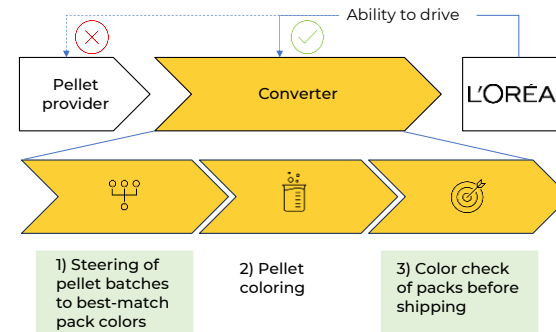


COMPARE IMAGES, PIXEL-TO-PIXEL, WITH SPECTRAL COLORS INDEPENDENT OF EXTERNAL LIGHT
~AS FORMAT (15x21cm), MULTIPLE COMPARE HEATMAPS: ΔE G/R THRESHOLD, ΔE FALSE COLORS, CMYK LEVELS...

14

PROSPECTIVE: 3 NEW LEVERS TO REACH 100% R-PET IN 2030

Objective : active management of PCR colors



8

ColorGrail technology bridges the interfaces in packaging supply chain



Added Value

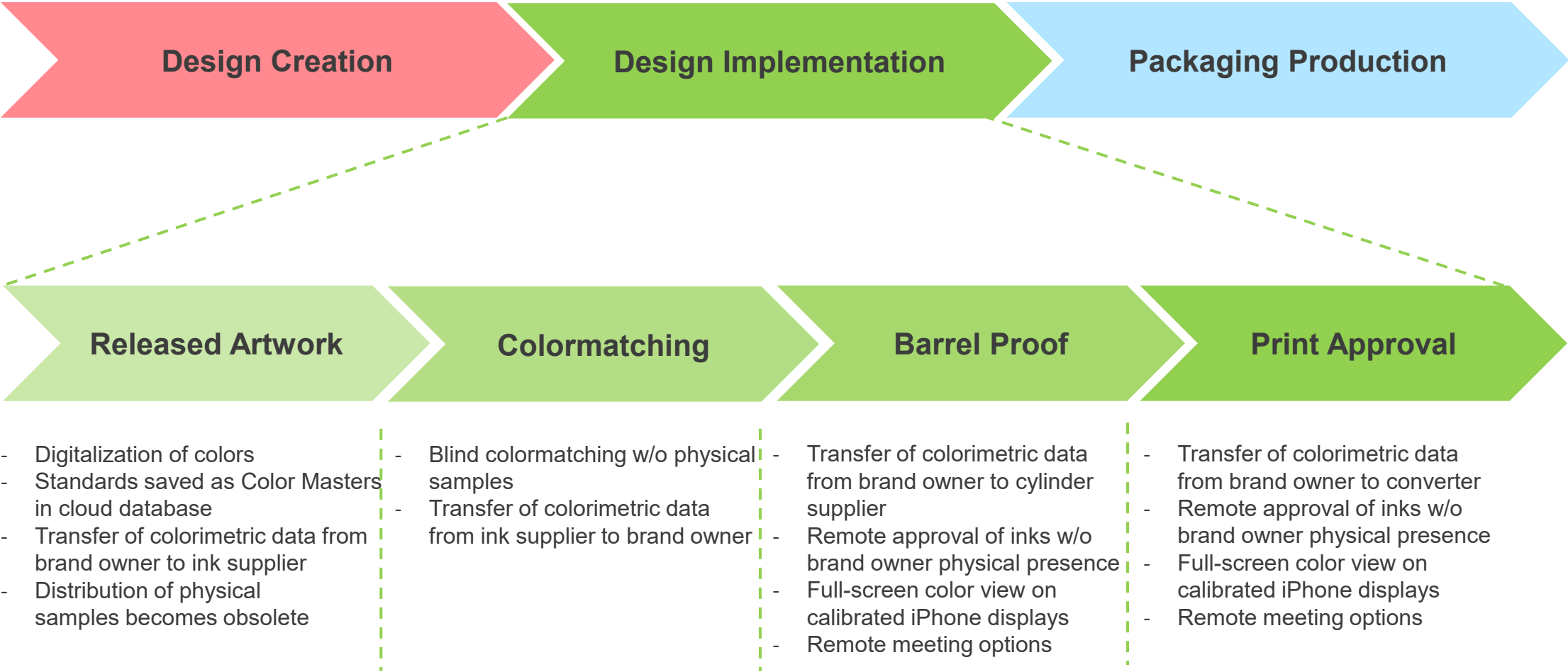
- Early-stage feasibility study of color reproduction
- Full digitalization of released artworks
- Blind colormatching w/o physical samples
- Remote brand owner approval
- Process & quality control (e.g. 7C-printing)
- Facilitation of project transfers

ColorGrail Feature

- Color measurement analogue to conventional 45/0-spectros
- Multi-angle measurement for metallic and effect inks
- Built-in remote communication tools
- Color measurement analogue to conventional 45/0-spectros
- Multi-angle measurement for metallic and effect inks
- Built-in remote communication tools
- Calibrated iPhone displays
- Color measurement analogue to conventional 45/0-spectros
- Multi-angle measurement for metallic and effect inks
- Built-in remote communication tools
- Mini-chart & Heatmapping

Faster time to market, less travelling, consistent communication

Deep dive: How ColorGrail technology supports design implementation in Tobacco packaging





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