

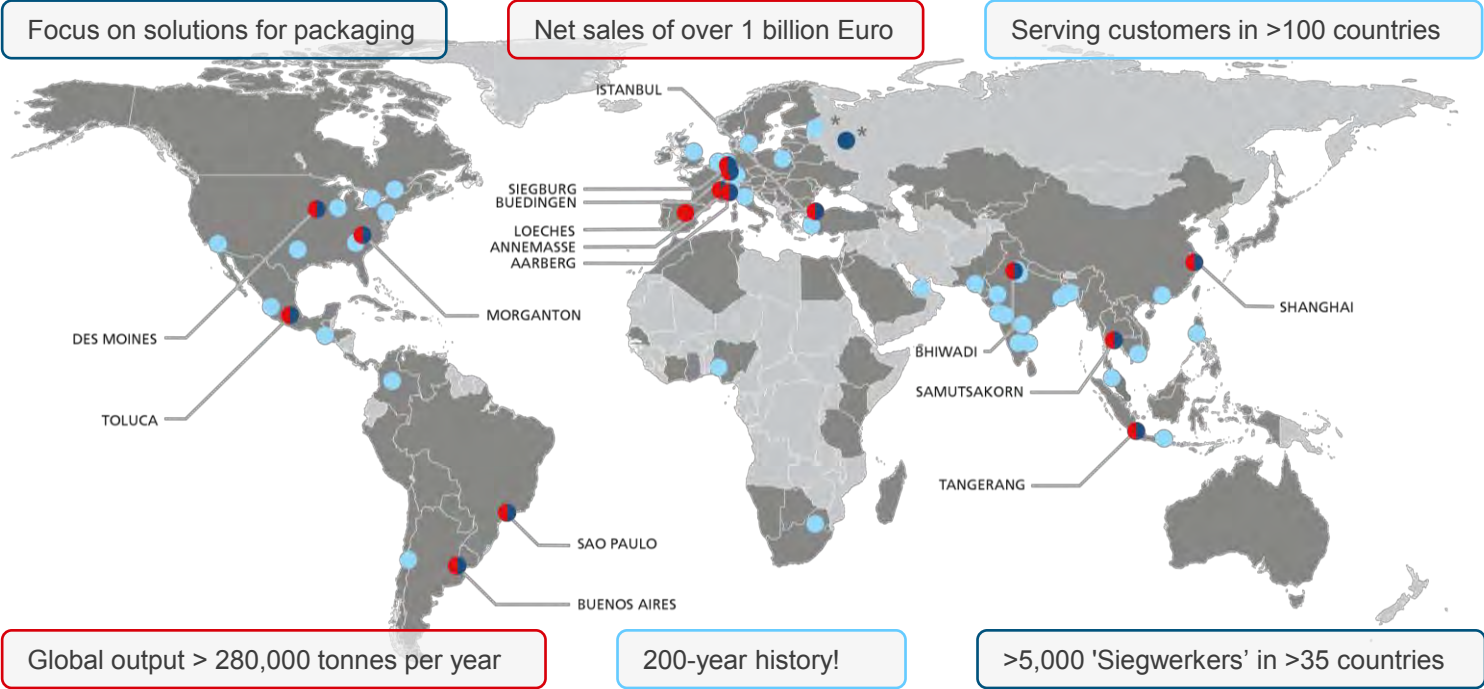


Functionalising paper: a path toward sustainable packaging

Gilles Le Moigne
Octima Conference 2024

Siegwerk at a Glance

Global Inks and Coatings Producer Enabling Circular Packaging Solutions



COMBINATION OF



barrier



sealability



safety

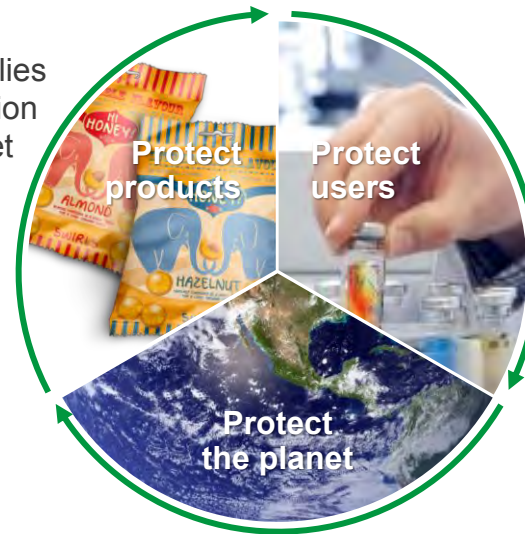


next cycle

Siegwerk enables packaging solutions

Our collaborative approach combined with deep technical expertise and business understanding enables us to deliver effective solutions

1. Product design relies on technical innovation & is based on market requirements



2. Product safety regarding food & consumer health is critical

3. Solutions must be sustainable and support a circular economy



What am I going to talk about today...?

Barrier and other functionality can be added at **multiple points in the value chain**, in multiple ways; where and how coatings are applied is as important as what coatings are used.

Main **benefits and challenges** of coating during paper production vs during printing.

Having the right partners is critical, and good **collaboration between partners** increases speed of transition and chance of success.

Transition plastic to paper requires expertise and collaboration across the value chain

Paper / Board

- ✓ High quality
- ✓ Smooth & dense
- ✓ Clay coated
- ✓ Suitable pulp recipe

Coating Application

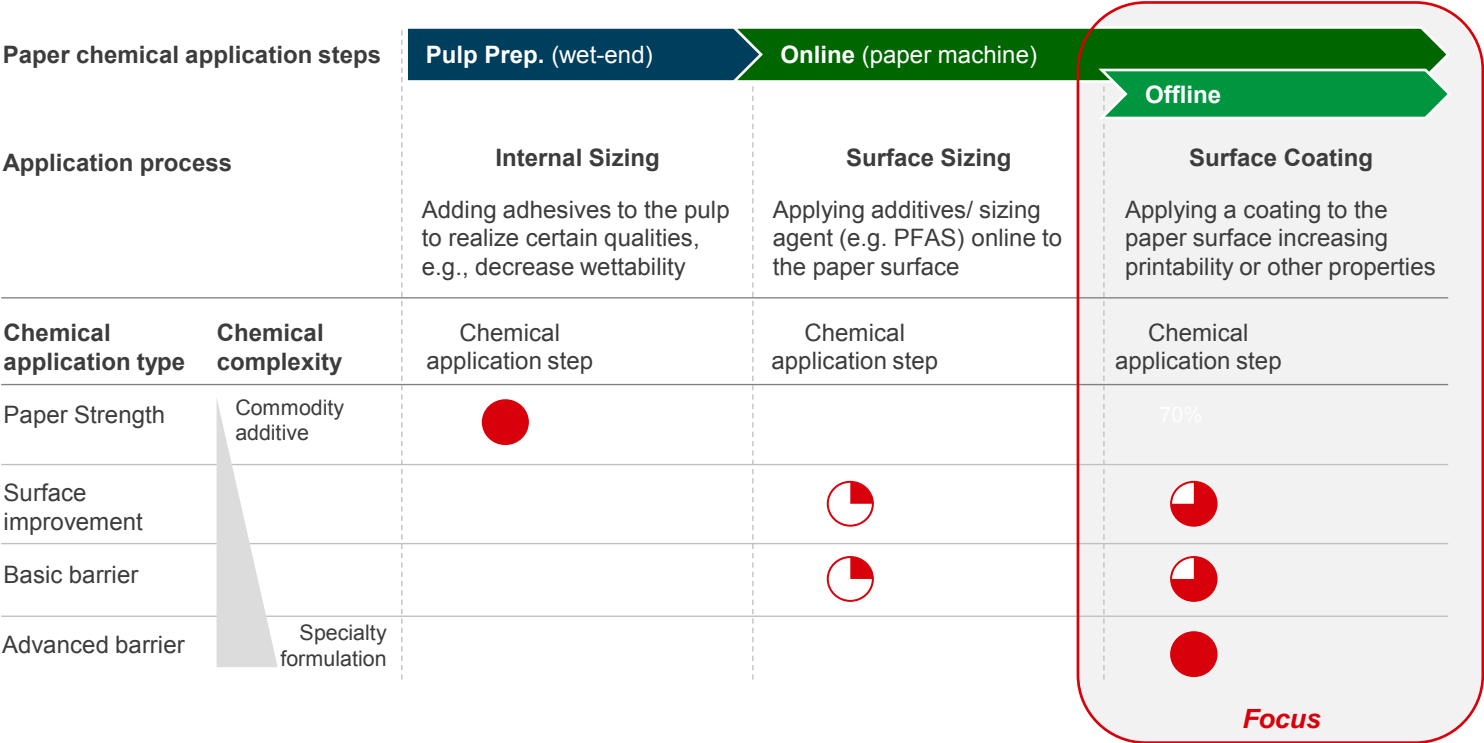
- ✓ Coatweight
- ✓ Coverage without defects
- ✓ Drying capability

Coating Formulation

- ✓ Functional components
- ✓ Viscosity & solids
- ✓ Runnability & stability

Collaboration

Paper chemicals, which are applied by paper mills earlier in the value chain, are a complimentary product to surface coatings



Coatings can be applied at different points in the value chain

Surface Coating Methods

Printing Methods

Online Coating



Most common methods are rod and blade

Offline Coating



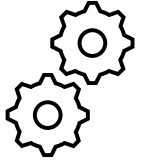
Many coating techniques found, often combined

Inline Varnishing



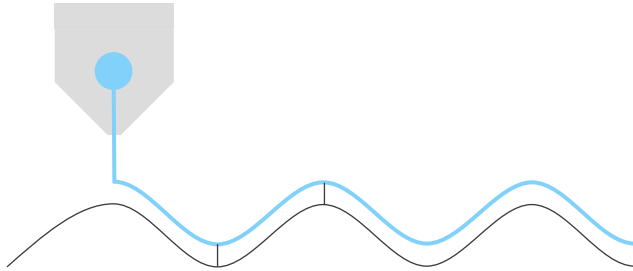
Flexo & Gravure for varnishing

Customised performance



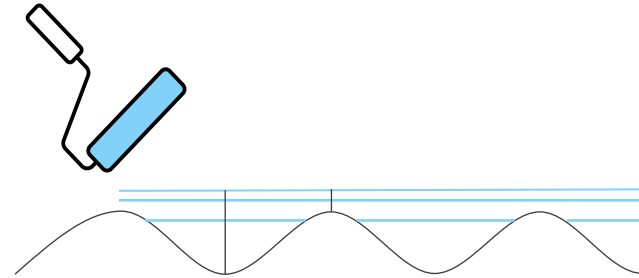
Importance of Coating Methods

Optimised barrier coating process



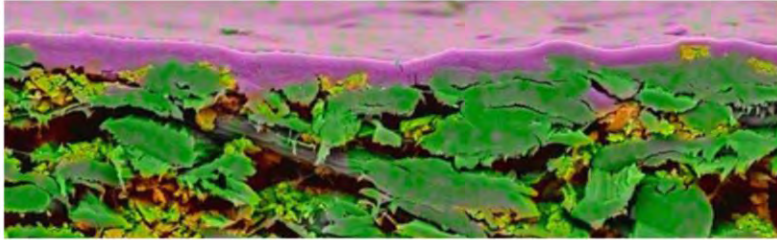
- Consistent coating thickness
- Curtain coating provides the best results and speed, but is challenging to handle
- Air knife is slower, but much more forgiving
- Lower total coating coverage needed to achieve good barrier performance

Other surface coating processes

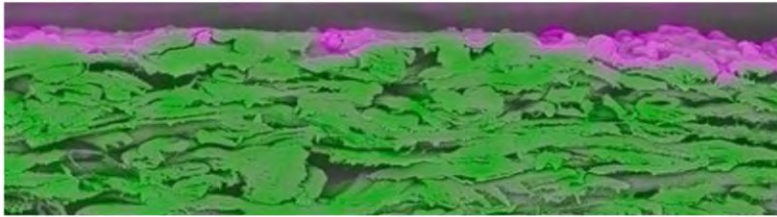


- Inconsistent coating thickness
- Most methods; Rod, Blade, Rev. Gravure, Film Press, Flexo, Gravure, etc.
- Blade is the most extreme example
- Higher application weight on coating machines vs printing machines

Multiple layers vs Contour Coating



- Example of double layer contour coating
- Consistent coverage across the fibre web
- **Cobb 1800 = 2gsm**



- Example of 1-layer non-contour coating
- Inconsistent coverage with some uncoated areas
- Some coating penetration into the paper
- **Cobb 1800 = 56gsm**



- Example of 2-layer non-contour coating
- Inconsistent coverage, but the complete surface is coated
- Some coating penetration into the paper
- **Cobb 1800 = 12gsm**






Viscosity is one of the most important characteristics of coatings

- ❑ High viscosity, low solids **solutions** vs Low viscosity, high solids **dispersions**
- ❑ Viscosity **needs to be in the acceptable range** for the coating process; different for each method
- ❑ Directly related to **solid content**, both for dispersion and solutions
- ❑ Solid content determines the **dry coating weight** achievable
- ❑ Solid content + wet coating weight = **how much water needs to be removed** = machine speed

➡ Easier to use low viscosity, high solids

Coatings can be applied at different points in the value chain

	<u>Strengths</u>	<u>Weaknesses</u>	<u>Best Fit</u>
<p>Online Coating</p> 	<p>Coating applied at high speed</p> <p>Cost effective</p>	<p>Inflexible process, not optimised for barrier</p> <p>Often high viscosity needed</p>	<p>Cost effective option for 'one-size-fits-all' solutions</p> <p>Best option for optimised process</p> <p>Ideal for topping-up the performance of paper and customized solutions</p>
<p>Offline Coating</p> 	<p>More optimisable process</p> <p>Many suitable techniques available</p> <p>Contactless drying</p>	<p>Additional process step adds handling and costs</p>	
<p>In-line Varnishing</p> 	<p>More flexible process</p> <p>Can apply in register</p> <p>Can apply after printing</p>	<p>Low viscosity and less drying capacity = Limited coatweight per pass</p>	



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Peppermint Pouches



Objective: Produce recyclable in-line printed and coated paper pouches for Drupa 2024

Printed at a commercial partner in Italy

Printing machine:

- DG-AUXO 900 combination Gravure & Flexo (160 m/min)

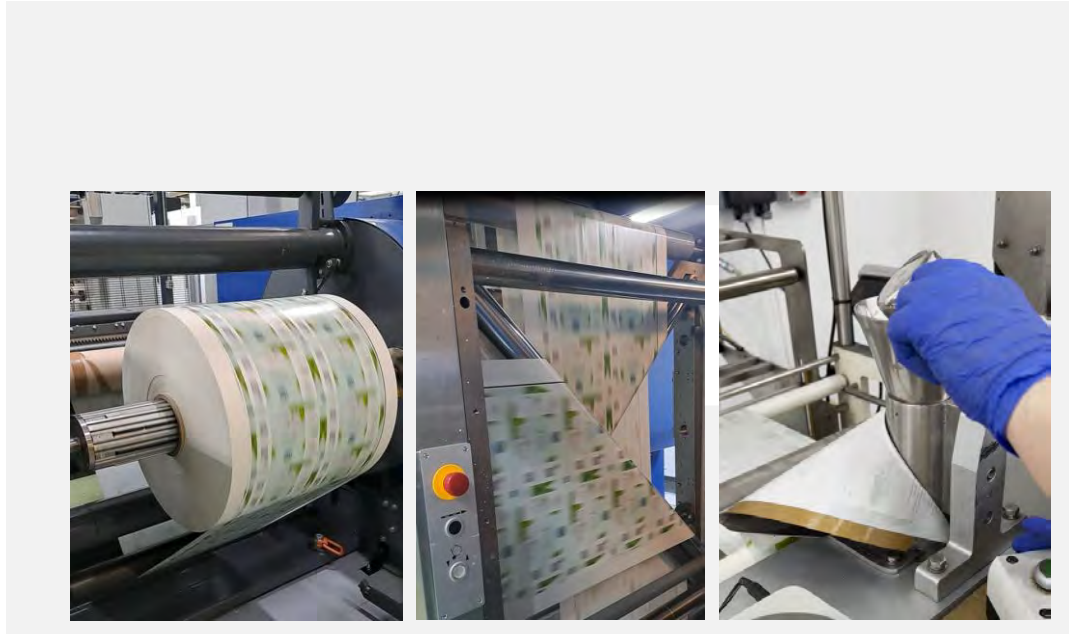
Substrate:

- UPM Solide Lucent 62 gsm

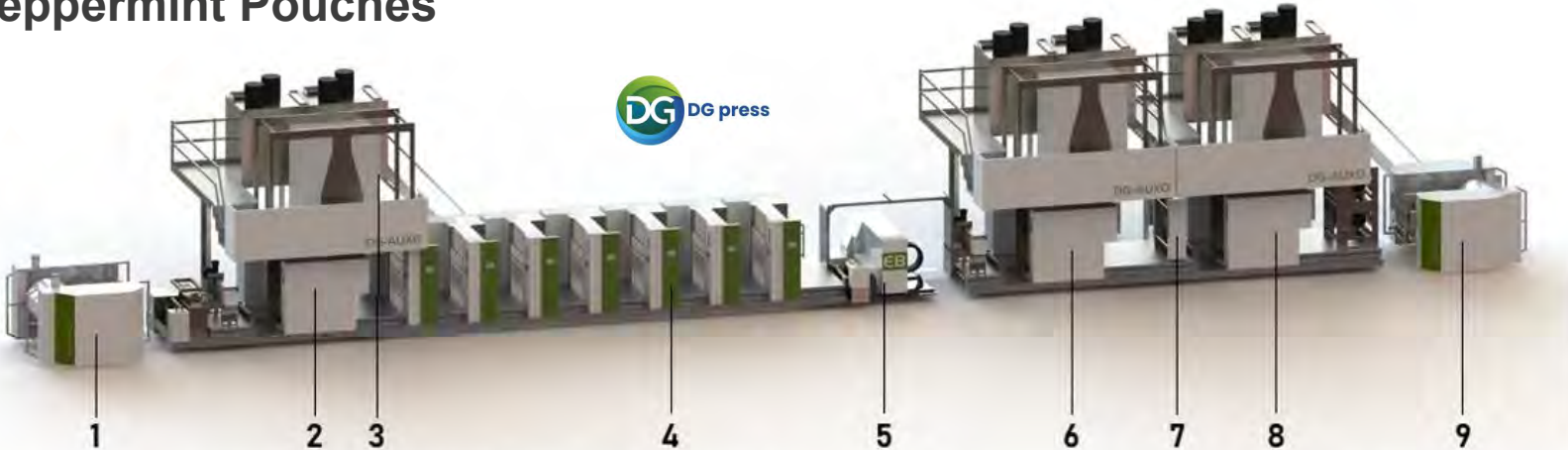
Coating:

- Target 3-4gsm
- 2-layers CIRKIT BAR SEAL PR 1684 = 32% solids / visco. 21s DIN4

Pouch making VFFS packing line at commercial contract packer in the UK



Peppermint Pouches



1 Unwinder

Substrate: Paper
 Brand: UPM
 Type: Solide Lucent
 Weight: 62 grams/sqm
 Thickness: 54 microns
 Web width: 580 mm
 Length: 15000 m
 Max. reel diam.: 1000 mm
 Core: 152 mm (6")

2 Roto coater

Heat sealable barrier coating
 Brand: Siegwark
 CIRKIT BAR SEAL PR 1684
 Type: BC 10-609684-5
 Water based
 Solid content: 32%
 Viscosity: 45 sec ± 5 (DIN 4 mm)
 Roto cyl engraving:
 Air temperature: 140° C.
 Air volume: High air flow
 Coating width: 480 mm

c.2gsm dry

4 Offset print units

Printing inks
 Brand: Customer standard
 Type: Indirect Food Contact
 Colors: 5 (CMYK + 1 PMS)
 Repeat length: 640 mm
 Two lanes (Double production)

3 & 7 Turnerbar positions

Swap front side to back side

5 EB curing

Ink polymerization
 Dose: 40 kGy
 Voltage: 100 kV

6 Flexo coater

OPV-1 (5000 m)
 Brand: Siegwark
 FIX RAPID HEAT RESISTANT OPV
 Type: 15-616108-5
 Water based
 Anilox: GTT Flex C13
 Air temperature: 90° C.

8 Flexo coater

Heat sealable barrier coating
 Brand: Siegwark
 CIRKIT BAR SEAL PR 1684
 Type: BC 10-609684-5
 Water based
 Solid content: 32%
 Viscosity: 45 sec ± 5 (DIN 4 mm)
 Anilox: APEX GTT Flex C18
 Air temperature: 140° C.
 Air volume: High air flow
 Coating width: 515 mm

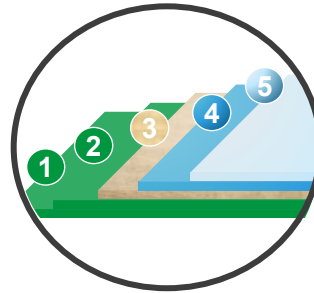
c.1gsm dry

9 Rewinder

Printed and coated paper
 Max. reel diameter: 1000 mm
 Core: 152 mm (6")

Peppermint Pouches

Objective: Produce recyclable in-line printed and coated paper pouches for Drupa 2024



WB heat resistant OPV

Offset EB Inks

Solide Lucent 62gsm

CIRKIT BAR SEAL PR 1684 (c.2gsm dry)

CIRKIT BAR SEAL PR 1684 (c.1gsm dry)

	Before	After
Cobb	25gsm 60s	7gsm 1800s
MVTR (grav.) at 23°C / 50% r.h.	43gsm/d	19 gsm/d
Oil & Grease (olive oil drop)	-	10 hrs
Seal strength at 140°C, 0.5sec, 5 bar	-	3.6 N/15mm



Collaboration...

...it sounds great, but I don't know how to get started...

Just do it !!

...you will find the way

thank you for listening



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Supporting paper and board suppliers to enable fiberbased solutions

Through our **dedicated Siegwerk Waterbased Coatings team**, including coating and packaging **application specialists**, we help connect the packaging value chain and provide **collaborative** expertise to **enable** and **accelerate** the use of circular fiberbased packaging solutions

	CIRKIT BAR SEAL CT 1420	CIRKIT BAR SEAL CT 1422	CIRKIT BAR CT 2513	CIRKIT BAR PR 2104	CIRKIT NATUBAR CT 4326
Barrier	Liquid	WVTR + Liquid + OGR	Liquid + OGR	Liquid + OGR	Liquid + Oil & Grease
Key features	Optimized for heat-seal performance	Optimized for barrier and heat-seal performance	Optimized for cost-efficient combined barrier performance	Optimized for combined barrier performance	100% natural SUPD compliant paper plates
Solids	23%	32%	44%	47%	31%
Viscosity	150 – 300 mPa·s	150 – 500 mPa·s	100 - 300 mPa·s	30 – 50s DIN4	50 – 200 mPa·s
Indicative barrier performance (6-8gsm dry)	COBB ₁₈₀₀ < 20 g/m ² OGR < 1 h WVTR (23/50) < 100 g/m ² /24h	COBB ₁₈₀₀ < 2 g/m ² OGR < 4 h WVTR (23/50) < 10 g/m ² /24h	COBB ₁₈₀₀ < 10 g/m ² OGR > 24 h WVTR (23/50) < 100 g/m ² /24h	COBB ₁₈₀₀ < 10 g/m ² OGR > 24 h WVTR (23/50) < 50 g/m ² /24h	COBB ₁₈₀₀ < 20 g/m ² OGR < 1 h "Picnic food" resistance
Converting performance	HEATSEAL >90°C, 2 bar, 0.5s 3-4gsm 2-5N/15mm excellent HOT TACK	HEATSEAL >90°C, 2 bar, 0.5s 3-4gsm 2-4N/15mm excellent HOT TACK		HEATSEAL >100°C, 2 bar, 0.5s 3-4gsm 1-3N/15mm	

Member of



Siegwerk supports you with...

- ✓ Collaborative approach focused on your needs
- ✓ Expert formulation knowhow
- ✓ Access to industrial trials and rapid development
- ✓ Market leading expertise in product safety

All our coatings are...

- ✓ Suitable for waterbased coating systems
- ✓ Customisable to specific application methods
- ✓ Formulated for food contact applications
- ✓ Tested to PTS-RH 021/97 for recyclability